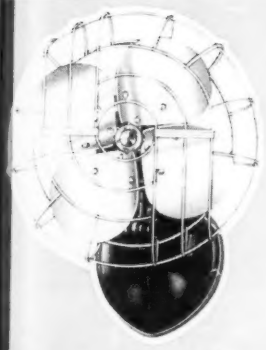
FEBRUARY, 1940

ELECTRICAL SOUTH



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NEW YORK WORLD'S FAIR BUILDINGS EQUIPPED WITH HUNTER FANS

A recent (FA) Busduct Installation —
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THE BEST BUSDUCT INSTALLATION IS ONE THAT IS MADE FOR THE JOB

No two installations are exactly alike. Each should be planned with its particular problems in mind. So, while

(FA) BUSDUCTS

are standardized, their design and construction permit of deviation from the normal that add greatly to their elasticity in installation, and their convenience in use. They form the ideal method of distribution for large jobs. We have built busduct systems carrying up to 12,000 amperes.

Housings of (FA) Busducts are of steel or aluminum up to 2,000 amperes—always of aluminum over 2,000 amperes. (FA) Busducts are completely engineered in every detail to render the most satisfactory service.

(FA)

SALES-ENGINEERS SPECIALIZE

in distribution problems. Their experience—together with that of the entire (FA) organization — is yours for the asking.

(FA) Sales-Engineers are located in the principal cities. Make it a practice to consult with them. It takes a lot of work and worry off your shoulders—and assures adequate quotations and a workmanlike job that will help maintain the reputation that you have so carefully built. . . . Send for Catalog 56. . . . Frank Adam Electric Company, St. Louis, Mo.

For Wiring Jobs

PANTHER & DRAGON TAPES

because:

1. ***First to be Wrapped and SEALED in Cellophane.***
2. ***Perfect Adhesiveness and Tensile Strength.***
3. ***Strong Distinctive Green Core.***
4. ***Colorful Attractive Boxes.***
5. ***A Company in the Insulation Business Since 1878.***

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

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Dallas Washington Cleveland San Francisco St. Louis Los Angeles

It's Frigidaire

2 complete new series reach every class of buyer!

8 STANDARD MODELS

Setting new high standards of value —with such de luxe features as stainless chromium shelves and Quickube Trays in *every* model, from highest to lowest in price. No other make refrigerator offers so many truly valuable selling advantages!

7 COLD-WALL MODELS

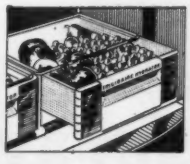
The finest refrigerators money can buy. Newly improved. Offer at new low prices the revolutionary Cold-Wall Principle that has been proved, in the homes of thousands, to be the most sensational refrigeration development since the first Frigidaire.

FRIGIDAIRE IS A Better Buy!

Double-Easy Quickube Trays come loose and cubes pop out instantly. No hacking, no melting under faucet. Greatest ice convenience ever offered—*in every tray in every 1940 model.*

Extra-Large Meat Tender slides out like a drawer. Saves food dollars every month by properly protecting all kinds of fresh meat and fowl. Also stores 100% extra supply of ice cubes.

New Stainless Chromium Shelves dramatize the beauty of Frigidaire interiors with bright, gleaming, mirror-smooth luster. Rustless and sanitary. Stay new for years. Cleaned in a jiffy. Another Frigidaire First! —*In every 1940 model.*



Glass-Topped Food Hydrators guard freshness of fruits, vegetables, other perishables so amazingly you can actually see dewy moisture on the glass covers. Preserve color, flavor, days longer.

One-Piece Steel Cabinet built to last a generation, seals in the insulation and prevents "water-logging" that destroys cold-keeping efficiency. Easiest of all cabinets to keep clean.

Meter-Miser . . . simplest cold-making mechanism ever built. Self-oiling, self-cooling. Silent, efficient—uses even less current than ever before. Exclusive F-114 Refrigerant—safest ever known.

for '40!

FRIGIDAIRE

NEW Design and Color Harmony! NEW Convenience Features!

NEW Low Prices!

America's No. 1 Refrigerator Leads Again!

● Does it have "that golden touch"? There isn't a single doubt!

It's big, it's beautiful, it's a bargain, this glamorous new Frigidaire. A stunning creation of master craftsmanship and engineering skill.

Eye-capturing is the cabinet exterior of rich new beauty . . . clean, appealing design! And what a picture inside! An artist's genius come to life! An exquisite color harmony of bright blue, dazzling white and glittering gold! Shining stainless chromium shelves . . . a new, extra-large Meat-Tender . . . Glass-Topped Hydrators! A jewel-like interior of convenience that will delight every woman who sees it!

And the beauty and value are more than meet the eye. Deep in the heart of this sturdy, one-piece steel cabinet, is the Meter-Miser, further improved for 1940...quietly and efficiently keeping food safer and freezing ice faster at *the lowest current cost in Frigidaire history!*

Yes, the new 1940 Frigidaire Refrigerator, backed with far-reaching and thorough selling support of all kinds, is as "good as gold" in the pockets of Frigidaire selling men. No wonder that, from coast to coast, the news is out: "It's Frigidaire for '40!"

Sensation of the Industry—
New Frigidaire Electric Range

Extra-Fast! • Extra-Sure! • Extra-Thrifty!

● Nine beautiful 1940 models include a new top-quality range equipped with two ovens . . . a traffic-building, sensationally low-priced cabinet model...and a new combination electric range and kitchen heater.

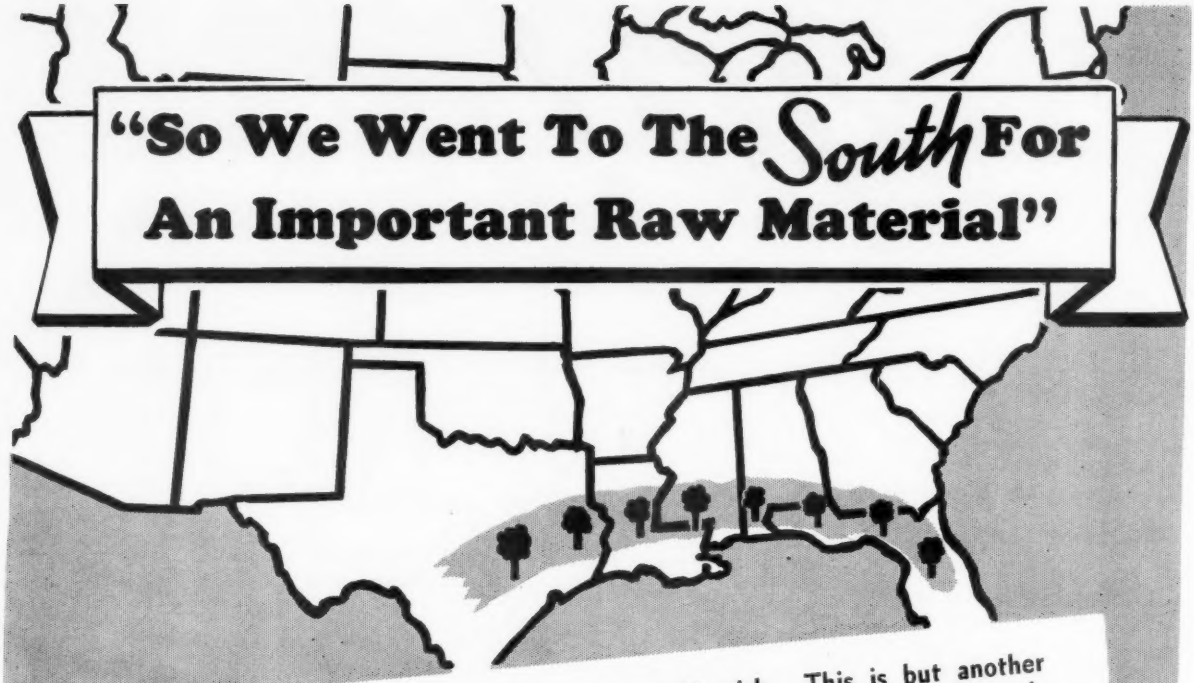
New features include a **New Simpli-Matic Oven Control** that provides super-fast pre-heating, then *automatically* switches to proper baking temperature...a **Thrifto-Matic Switch** on the rear surface unit and Thermizer well-cooker that *automatically* turns from high to low heat when desired . . . **New Signal Lights** that glow whenever any surface or oven heat is turned on . . . and efficient **Cooking-Top Lamp** on every household model.

We say with confidence that, with its many selling advantages, the new 1940 Frigidaire Electric Range will exceed the sales and profit expectations of every Frigidaire selling man!

New 1940
FRIGIDAIRE ELECTRIC WATER HEATERS

● The Frigidaire Water Heater line now includes a handsome "Super-Value" model selling at the lowest price ever placed on a Frigidaire Electric Water Heater. Opens up great new sales opportunities. There are also beautiful new De Luxe Cabinet models, and a trim Table Top model (36" high).

FRIGIDAIRE DIVISION • GENERAL MOTORS SALES CORPORATION • DAYTON, OHIO



"So We Went To The *South* For An Important Raw Material"

For over a quarter of a century the JOHN C. DOLPH COMPANY has manufactured CHINALAK Insulating Varnishes for the electrical and allied industries. One of the basic raw materials was Tung Oil imported from China. However, international complications and local disturbances made the supply so erratic that we searched for a more reliable source of supply.

So we went to the South for an important raw material. Due to ideal climatic conditions, Tung trees can be grown in certain Southern States. The oil from these trees is superior in quality to the Oriental grades. Because of the more modern processing equipment used, this American Oil is more uniform than the imported material.

As a result of negotiations with the General Tung Oil Corporation, we will use American grown Tung Oil on all future shipments of CHINALAK Insulating Varnish. This is but another example of the DOLPH Company's policy of Continued research to maintain and improve the high standards of quality that have always characterized DOLPH Products.

What does all this mean to you?

It means that you are assured of a continued supply of CHINALAK Insulating Varnish. You will find that the quality is better than ever. It means that industrial plants who say "CHINALAK is the finest varnish obtainable . . . . . "CHINALAK has increased the life of our motors over 300%" will not have to resort to an inferior grade.

If your motors are not protected by DOLPH'S CHINALAK Insulating Varnish, we would like to tell you the full story. Why not write today and learn how CHINALAK can save money for you?

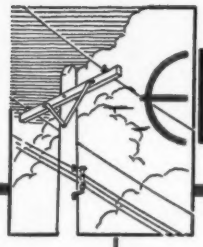
JOHN C. DOLPH CO.

INSULATING VARNISH SPECIALISTS

166 EMMETT STREET NEWARK, N. J.

FEBRUARY
1940

Volume 20 No. 2



ELECTRICAL SOUTH

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ATLANTA, GEORGIA

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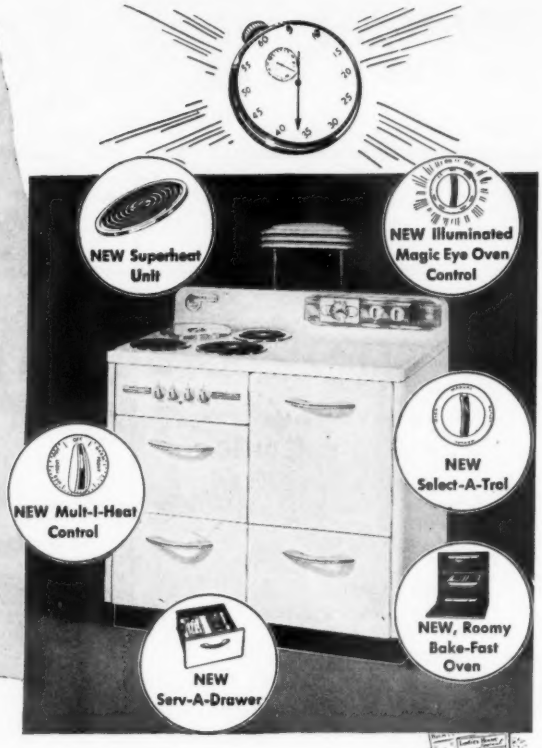
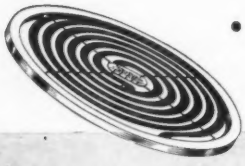
SPEED TEST rings up UNIVERSAL range sales

New Superheat Units and Bake-Fast Oven make the 1940 Universal—



The Nation's FASTEST...MOST AUTOMATIC ...MOST ECONOMICAL Electric Range!



Introducing the new Superheat Unit—fastest by test!

One big secret of Universal's superior speed—the new Superheat Unit. In addition to setting new cooking speed records, Superheat is proving itself durable, efficient and economical. Easy to clean—and keep clean.

For the first time on any range—UNIVERSAL'S Superheat Units with Mult-I-Heat Control give 101 different heats for top-of-stove cooking—UNIVERSAL'S Bake-Fast Ovens are larger, faster and more economical than ever. Add these to its startling new beauty and you have a sales making combination that's exclusively UNIVERSAL.

To help you build bigger profits, Universal is backing this electric range sensation with a nation-wide advertising and publicity campaign that invites 30 million American families to see, test and buy. *Wire or write for full details.*

SELL ON PROOF

Universal's Stop Watch Test *proves* new unit speed . . . *proves* new oven speed. Customers convince themselves.

NATIONAL ADVERTISING CAMPAIGN
NEWSPAPER ADVERTISING IN MAJOR MARKETS
TIE-IN WITH MODERN KITCHEN BUREAU PROGRAM
COOPERATIVE ADVERTISING
PICTURE FILMS AND VISUALIZERS
UNIVERSAL UNIVERSITY SALES TRAINING COURSE
RADIO AND DIRECT MAIL CAMPAIGNS
BILLBOARDS AND WINDOW DISPLAYS

Universal ELECTRIC RANGE

Made by LANDERS, FRARY & CLARK · New Britain, Conn., U. S. A.

Electrical Business Trends

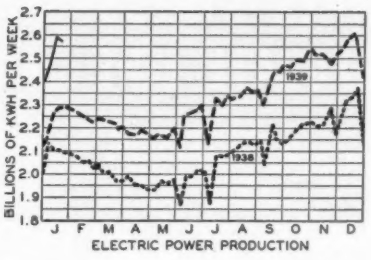
A GENERALLY favorable outlook for 1940 is indicated by replies to a questionnaire sent to members of the Board of Governors of the National Electrical Manufacturers' Association by Charles E. Swartzbaugh, president of the Association.

The concensus of the replies presents the opinion that general business in 1940 will reach higher levels than those of 1939. A continued rise in the durable goods field also is expected with the electrical industry branches following a trend at least equal to that of general business and the durable goods lines.

All branches of the industry gave indications of anticipating a good, if not a spectacular, year. The outlook for industrial modernization appears especially to be better than experienced in 1939. Also, it was indicated that there is a very real need for expansion and modernization of the electrical utilities.

* * *

A very important factor in improving local conditions for the electrical industry is the continued increase in building construction. Statistics released by the U. S. Dept. of Labor for the first eleven months of 1939 indicate that dollar value of all building construction was 17 per cent above the same period of 1938. The increase in residential construction was 43.1 per cent for the United States as a whole but amounted to 71.3 per cent in South Atlantic states where the construction industry has been particularly active.



ELECTRIC POWER PRODUCTION

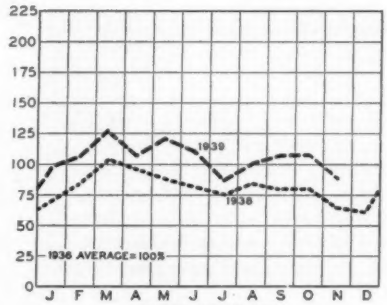
Per Cent Changes 1940 Over 1939	Week Ending Jan. 27	Week Ending Jan. 20
New England	+ 9.0	+10.2
Middle Atlantic	+ 8.4	+10.1
Central Industrial	+14.6	+16.2
West Central	+11.7	+10.6
Southern States	+14.8	+14.6
Rocky Mountain	+21.2	+16.5
Pacific Coast	+10.3	+ 7.8
Total	+11.9	+12.3

Although appliance dealers report the customary seasonal decline in November sales of refrigerators and ranges, sales were excellent in comparison with November 1938 sales. Household refrigerator sales totaled 55,113 in November 1939 for the country as a whole, an increase of 72 per cent over 1938. In the sixteen southern states the increase amounted to 127 per cent. Sales for the first eleven months of 1939 were 51 per cent above the same period of 1938.

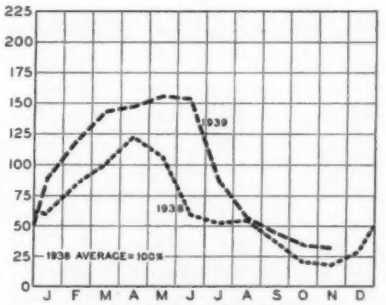
Range sales for the first eleven months of 1939 totaled 306,300, a substantial increase over the same period of 1938 although exact sales data for 1938 is not available. Range sales in the southern states totaled 69,948 for the first eleven months of 1939.

Household washers shipped in November broke all records for that month, totaling 102,990, an advance of 22.3 per cent over the same month in 1938. Ironers shipped in November aggregated 9,990, an increase of 21.5 per cent.

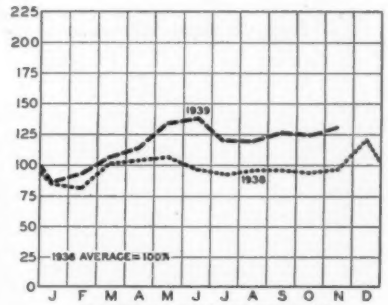
Vacuum cleaner sales in November were the highest in the history of that month, totaling 141,066, and exceeding the same month of 1938 by 18 per cent.



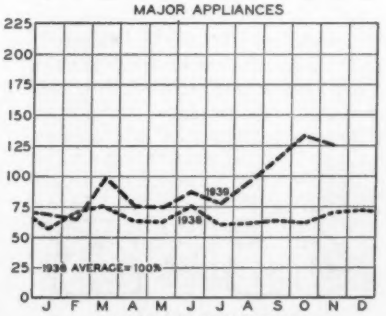
MAJOR APPLIANCES



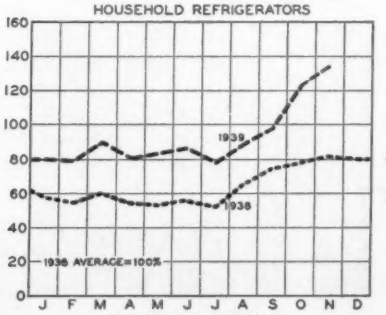
HOUSEHOLD REFRIGERATORS



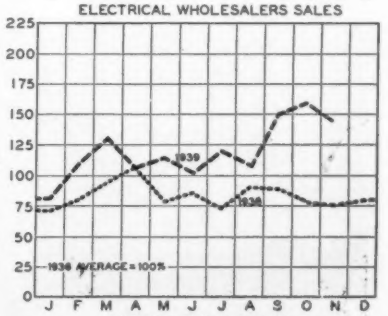
ELECTRICAL WHOLESALERS SALES



MOTORS AND GENERATORS



INDUSTRIAL MATERIALS



DISTRIBUTION EQUIPMENT

All of the above indexes of electrical business activity are based on figures available from the National Electrical Manufacturers Association, except the index of electrical wholesalers' sales which is based on data published by the United States Department of Commerce. The indexes on motors and generators and distribution equipment are based on orders received, while the index on industrial materials, including such items as electrical porcelain, mica, vulcanized fiber and laminated products, is based on sales billed. The index on distribution equipment includes such items as high voltage insulators, paper cable, power switching equipment, power distribution transformers, and varnished cambric cable. The index on major appliances does not include refrigeration and is based on sales billed. The index on household refrigerators includes complete household refrigerators, separate household evaporators, and separate systems of 1/4 horsepower or less. The index on electric power production is based on data released by Edison Electric Institute.

REA to Promote Sale of Appliances
Far-Sighted Selling
THESE HEADLINES STRESS THE IMPORTANCE OF ADEQUATE LINE CAPACITY
Refrigerator
Up 53% for 6 Months
Show Light Lost by Undersized Wire
Lighting Market Can Be Quadrupled
Primary Load Up 9.1%
Washer Shipments Rise
Iowa Utility Extends Load Building Drive
Refrigerator Sales Continue Advance
Line Building Program Anticipates Added Load
Appliance Sales Soar in Mississippi Drive
Appliance Sales Continue Upward Trend
Intensive Load Building Now Major Rural Job
Kellogg says industry is faced with making investments in rural lines successful and electricity useful to millions more citizens —
Rural Sales Meeting to Be Held by E.E.I.
Vacuum Cleaner Sales Up

ALCOA

After a rural line is promoted, planned and built, demands for power must be built up. There can be no happy ending to this story unless the line becomes a paying proposition.

Can there be a happy ending to the story of your lines? By insisting on A.C.S.R. conductors, you can make certain that they'll have sufficient current carrying capacity to become self-supporting.

A.C.S.R. provides the highly desirable combination of high strength, resistance to corrosion and high conductivity which makes possible the construction of high quality, low cost lines. A.C.S.R. has a long history, over a quarter of a century, of successful performance.

ALUMINUM COMPANY OF AMERICA, 2164 Gulf Building, Pittsburgh, Pennsylvania.

A · C · S · R

Aluminum Cable Steel Reinforced

FOR RURAL LINES AND POWER TRANSMISSION

Planning Effective Sales Contests

WELL planned and properly staged sales contests can play an important part in the electrical appliance dealer's promotion program. This is the first of a series of articles based on an intensive and extensive study of contest methods and practices applicable to the appliance business.

THE question of the value of sales contests has been much discussed since about 1932, when, during the depression, sales executives and store managers had been casting about desperately for anything to increase sales. Prior to that time, contests had been a part of regular yearly routine, being run about three months out of each year as a goodwill gesture to the salesmen. In 1931 and 1932, with sales charts dropping every day, sales managers spent considerable sums devising and promoting every kind of contest imaginable among their salesmen, many organizations having two or three contests running at the same time.

This frantic activity permeated the entire electrical merchandising industry, from manufacturer to dealer, some retailers using canned contests prepared by manufacturers, some developing their own, some using both.

These haphazard efforts brought little fruit; however, for that matter, no promotional effort was successful in those dark days. Following the birth of the N.R.A., many companies made inter-industry agreements to ban contests, arguing that they could, by mutual consent, save themselves additional overhead expense which had not been productive anyway. In the past two or three years, however, the nation's leading sales counsellors have been busily removing the obstacles erected against sales contests, and have been recommending a substantial budget for them in every year's operation.

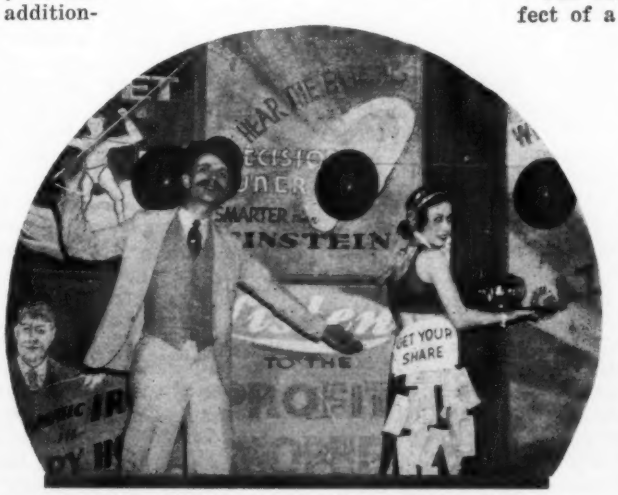
The trouble, they argue, lay, not with the contest system itself, but with the way it had been used. The philosophy behind those depression contests of 1931, 1932, 1933 was wrong; they were last-minute efforts to give business a shot-in-the-arm, to spur harassed salesmen to super-human efforts in going out to get business where there was none to be had. And a contest the sole purpose of which is simply an immediate increase in volume is doomed to failure, both in its immediate objective and in its future effect upon the sales staff. It appears, then, that at least half of a contest's success depends upon whether it is properly conceived and geared, whether the sales manager or proprietor who stages it knows just why he is putting it on, and just what it should accomplish.

Contest Objectives

A constructive contest should set out to accomplish four principal objectives: these are the same whether the organization is a retail appliance sales crew, a jobber's organization, a contractor's soliciting staff, or a manufacturer's group. They are: to show the salesman what he should be (to set up an ideal), to show him what he should know (open up a new field of knowledge), to show him how he can attain these two ideal conditions, and to help him do it.

A good sales contest goes far beyond a mere offering of a few dollars worth of merchandise to any salesman who will wring a few more orders out of his customers, or do a little extra canvassing: sound, conscientious, productive sales efforts can't be bought. The immediate purpose of a contest is to arouse interest among salesmen in their work, to transmute the daily chore into something akin to fun, to make him think "If I close this deal, I'll be high man this week" rather than "If I don't close the deal, the boss will give me the dickens." This state of mind, obviously, will be more conducive to a wholehearted and, more important, lighthearted effort on the salesman's part, and will bring in a natural increase in business.

The secondary purpose and effect of a contest is of equal importance, if not greater. Each contest is, or should be, a sales campaign wherein the company is sold to the salesman, the effect of which will do much in coloring his inward feeling and attitude toward his employer. Look at the most successful selling organizations in the world, and you'll see organizations with that intangible something called *esprit d'corps*, or company loyalty. The salesman working for such an organization, by every act and word, says, in



Something of the circus barker's methods of showmanship may stimulate the salesman's interest in a contest and attract the attention of the public

A good sales contest goes far beyond a mere offering of a few dollars worth of merchandise to a salesman who will wring a few more orders out of his customers or do a little extra canvassing. It arouses interest among salesmen and changes the daily chore into something akin to fun.

●

effect: "Yes, sir! I work for the Blank Company . . . swellest outfit in the country! They treat me right, and I'd work overtime for 'em seven nights a week if they needed me, and I'll betcha my boss can lick your boss!"

Every relation between employer and employee, daily contacts, letters, conversation, pay-checks . . . all are a part of the influences which make up the salesman's attitude toward his company. But never does he put it in words to himself: he's just John Jones, selling for Blank Company . . . nothing dramatic about that. Daily routine doesn't give him a chance to realize a deeper feeling about his employment. But tell him that his company is a ship, and that he's a seaman, charged with the job of helping sail her past the reefs, or pumping water out of the hold, and immediately he knows whether he's the kind of sailor who will go the limit for the skipper, or whether he would go over the side at the first port.

Sales contests express the daily routine into other terms, giving the salesman a perspective which brings home to him just how he really feels about his job, and permits a little emotion to creep in between the sheets of his order book. Salesmen will remember successful contests long after they're closed, will reminisce gleefully in the parlance of the contest: Yes, I was sort of resting on my oars there for a while, but Cap'n Smith (the sales-manager), the old pirate, he sort of swatted me with his cutlass a time or two, and by June I had the old tub high up on the beach!"

Sales contests transmute sales work, and company-employee relations from the unyielding, hard-boiled parlance of business into terms of more volatile, expressive worlds, where the salesman's true feeling of loyalty to his boss can color his work and his attitude.

Sales not the Only Objective

Moreover, sales contests give the sales manager the best chance he'll ever have to tell his salesmen what is wrong with their work, to coach and educate them, without rubbing them the wrong way. All salesmen resent, to some extent, the management's efforts to prod them, to criticize them, to "run the sales department from behind a desk." Appliance and electrical salesmen in particular are specialty men, fast-talking, fast-thinking fellows, accustomed to adjusting themselves to quick changes of prospects' attitude; self confidence plays a very important part in their operation. Coaching and criticism, no matter how much needed or how valuable, can either antagonize such a man, or tear down part of his confidence in himself, if presented the wrong way. But if he's a baseball player, and you're the captain of the team, you can tell him that he shouldn't have tried to steal third on that bunt, or that he stands too far from the plate, and he'll take it in good part. More sales education has been poured into salesmen through the disguised parlance of a sales contest than was ever driven home in the boss's office.

Thus a carefully planned, properly staged and skillfully conducted sales contest can profitably form a part of the promotional schedule of every dealer in electrical merchandise, large or small, utility or independent, contractor or appliance merchandiser, every year, and the result will not only be increased sales during the contest, but a better trained, better organized, more loyal, happier crew of salesmen, and the benefit will reach far into the future past the actual operation period of the contest.

What, then, is a carefully planned, successfully staged, contest? First, the basis of competition must be established. Most contest users long ago abandoned an open, neck-and-neck rate between individual salesmen, since disparities of individuals, territories, and conditions frequently found the same man taking home the purse time after time. Nearly every organization has its "top" man, and its "plugger," but both play an important place in the operation, each filling a niche into which the other would not fit.

Further, salesmen handling different lines of merchandise require different classification: obviously, the differences in the potentials of a man handling refrigerators exclusively must be levelled with those of one specializing in radios and home laundry. If an electrical contractor has a merchandising department, then plainly the sales picture of his contract solicitors will be entirely different from his appliance men's set-up. The most logical solution has been found to place each man in competition with himself, to set up a quota of business for him to shoot at, and reward him in ratio to the nearness with which he reaches this individual goal. Thus the inequalities of territories, floor time, service calls, different lines of equipment are levelled, and each man may expect to reap reward in proportion to the efficiency with which he performs his own job.

However, it must be remembered that salesmen won't respond to a contest just on the hope of gain alone. Some measure of competition must be instilled also, some chance to beat the other fellow. It is human nature for Jones to want to beat Smith, and if he can

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This Dealer Wouldn't Listen To "Poor Market" Talk

By Murray Orman

THE Music Mart, in El Paso, Texas, has gained an unusual reputation for selling washing machines in a town considered by some manufacturers as a poor market for this product. Dean V. Rittman, the firm's washing machine sales manager, won third prize recently in a national contest conducted by a washing machine manufacturer. The successful efforts of this firm have disproved the theory that washing machines cannot be sold in volume where there is an abundance of low-priced domestic labor available.

The strategy that has worked so well for this company in selling washing machines embodies extensive newspaper advertising, window displays, direct by mail campaigns, canvassing, and home demonstrations. The manufacturer furnishes many suggestions, and the company takes advantage of all that are practical to El Paso.

Demonstrations sell from fifty to seventy-five per cent of the machines thus put out. They are not made promiscuously, however, because of the trouble involved and because the prospect often will not have complete facilities immediately available to make the demonstration a success. They are used specifically with customers who are extremely dubious or with customers who do not understand the operation of the machine, and of course with anybody who requests it. The firm advertises its willingness to make free demonstrations.

The housewife is invited to put a big basket of clothes in the washer and operate it herself while the salesman stands by to instruct her. The salesman encourages her to be curious about how the machine will work. He explains the controls, then steps back and lets her run it.

If possible the sale is closed the first night. If not, the salesman asks permission to leave it there for a few days so that a neighbor or two can be brought in for a demonstration. Pride in the possession of the washer, the habit of having it, and a realization of its convenience will usually come during these few days, and the prospect often buys.

Short, catchy direct-mail advertising letters are used with great success. The letters must be short, with short sentences and short paragraphs to demand attention, yet they must be provocative and contain enough information to stimulate the desire to buy. The most successful letter used by the Music Mart had a few one sentence paragraphs asking the reader if she would rather spend the afternoon playing bridge, attending a concert, playing golf, or supervising a week's wash. Following those sentences, two longer paragraphs mentioned the washing machine.

The letter was written on the upper half of a folder. It aroused the interest of the reader enough for her to unfold the bottom half and read it. It contained a number of the salient features of the washer attractively presented.

The window displays incorporate both the ideas of the salesmen and

(*Continued on page* 16)

The sales program of the Music Mart centers about a carefully maintained prospect file. The file cards feature a classification of each prospect. The window display at the right, with its many explanatory tags, proved most successful in stopping passers-by.

Spotlight EACH PROSPECT ACCORDING TO NEED

WOMAN No. 1
• THE WOMAN WHO DOES ALL HER OWN WORK. She is one of your largest classes of prospects . . . and Bendix has a powerful appeal to her.

WOMAN No. 2
• THE WOMAN WHO EMPLOYS A LAUNDRESS BY THE DAY. Another important class of prospects . . . Bendix time and money saving features will appeal to her.

WOMAN No. 3
• THE WOMAN WHO SENDS HER CLOTHES TO THE COMMERCIAL LAUNDRY AND IRONS THE "WET WASH." Bendix saves her both labor and money.

WOMAN No. 4
• THE WOMAN WHO EMPLOYS THE COMMERCIAL "WET WASH" LAUNDRY AND HIRES A LAUNDRESS TO DO THE IRONING. Economy appeals to her.

WOMAN No. 5
• THE WOMAN WHO SENDS THE LAUNDRY OUT TO BE WASHED AND IRONED. With Bendix she avoids the nuisance of washday . . . cuts expense.

WOMAN No. 6
• THE WOMAN WHO HAS A MAID FOR ALL HER WORK. She can well afford a Bendix . . . approach her with the impressive individual appeal.

Know how to classify these six types of prospects . . . and how to approach each of them. The Sales Guide Booklet, "Six Women and a Bendix," will help you develop an effective approach to each type.

Then sell each prospect on the basis of known buying reasons

IN U. S. A. FORM NO. 142

Name		Salesman		
HOME ADDRESS	PHONE	BUSINESS ADDRESS		PHONE
MAKE OF WASHER OWNED	AGE OF WASHER	NUMBER IN FAMILY	LAUNDRY COST PER WEEK	Type of Prospect
TRADE-IN OFFERED	TRADE-IN WANTED	BEST TIME TO SEE	SOURCE OF PROSPECT	1
Date	RECORD OF SELLING ACTIVITY			2
				3
				4
				5
				6
				See Reverse Side

Portable Clinics Make Good Use of Electric Service

By Charlotte M. Temple

President, Roanoke County
Tuberculosis Assn., Virginia

RESIDENTS of Roanoke County, Virginia, can testify that rural electrification has meant much more to them than convenient kitchens, household appliances and electric lights, for electric service has made available expert medical and dental care in even the most remote districts of the County.

An alert county nurse, Mrs. Jane Morgan Harris, saw her opportunity when the rural schools were electrified, and there are now in operation, two motor trucks—a mobile medical service and a mobile dental clinic—which carry the efficient services of local physicians and dentists to the remotest school districts in this county, the entire boundary line of which is over the top of some mountain of the Blue Ridge that encircle the Roanoke Valley.

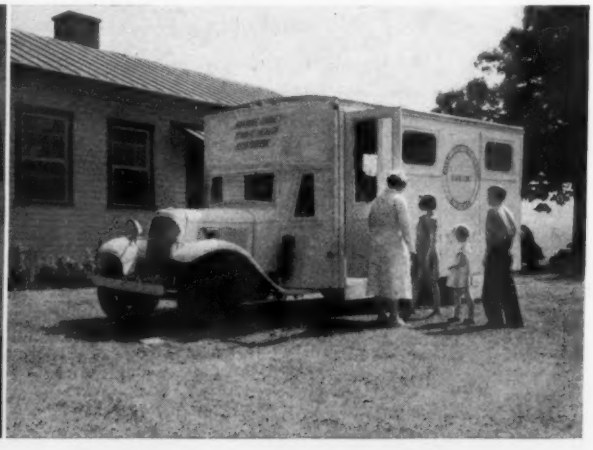
Both these electrified offices on wheels, were built at little expense on reconditioned trucks. The outside walls are of Masonite, finished inside with wall board, with screened windows and doors placed conveniently. Pulling up to the school on schedule time, they are connected to the school's electric service and the clinics are ready for operation. These motorized units of the county fleet, fighting disease among the people in the open country, are equipped with electric heaters, water heaters, sterilizers, lights and hot plates. Upon arrival, there is always a waiting line of patients, adults from the community as well as ailing children, whom the teachers have sent to the clinic.

School children are given toxoid injections; treated for skin eruptions; eyes, ears and throats are examined; expectant mothers advised; men with rheumatism and other physical ailiments, treated. Where necessary, the folding examing table is opened out.

A striking illustration of what electrification of rural schools can mean to the people, was made in the month of October, when the medical truck visiting 33 county schools, white and colored, carrying a staff made up of a local physician, the county nurse and a clerk, gave the tuberculin test to 956 children who were under weight or had had known contact with tuberculosis. This was followed in November by an X-Ray clinic, where reactors from the tuberculin test and other persons wishing to have chest pictures made, were given the opportunity to do so far $1.00 each.

The dental clinic spends the day at any given school, where called, for a minimum of 15 operations per day. Examinations are free to all, but otherwise the dental service is for the indigent and near-indigent, only.

Obviously, rural electrification means infinitely more to these people of the farms than convenient kitchens, household appliances, and greater efficiency in farm work. It means a fair chance for health and medical attention for everybody. Especially, does it mean a better chance in life for the most valuable crop any county can raise —a crop of healthy, normal children to go out into the world of tomorrow.



Rural Electrification in Roanoke County, Va., is making expert medical and dental care available to residents and school children in even the most remote districts in the county through the use of these two clinics on wheels. At left below is an interior view of the medical clinic and at right a group of children about to enter the dental clinic. At upper left, the dental clinic is parked beside a county school ready for examinations. (Photos courtesy of Appalachian Electric Power Company.)

Dealers Hold "Look Around Night"

ELECTRICAL appliances dealers recently co-operated with thirty-one other Brownwood, Texas, merchants to hold the town's second highly successful semi-annual "Look Around Night." The idea induced hundreds of people to inspect and witness the demonstration of electrical appliances, who could not have been otherwise induced to look at the merchandise, according to those participating in the program.

Twice a year—spring and fall—Brownwood merchants get together and co-operatively invite the public to take an evening off, come downtown and inspect the show windows and other exhibits to see what the new seasonable merchandise is like.

The recent "Look Around Night" featured co-operative exhibits and demonstrations by seven local electrical appliance dealers in the show-

Electrical appliance dealers of Brownwood, Texas, took advantage of the town's second highly successful "look around night" to demonstrate appliances to scores of prospective purchasers. The Texas Power & Light Company made its local show rooms available for dealer displays, some of which are shown here.

rooms of the Texas Power & Light Company, local utility firm. Each dealer had one or more attendants on hand to demonstrate his equipment, and the power company acted as host to the visitors.

Among the appliance dealers co-operating were: Pecan Valley Electric Company, Weakley-Watson-Miller Hardware Company, Singer Sewing Machine Company, Austin-Morris Furniture Company, Montgomery-Ward & Company, Dublin's, Firestone Auto Supply Company, and Brownwood Fixture Exchange.

Heavy Trade-in Volume Made To Return a Profit

TRADE-IN volume on used refrigerators equals twenty per cent of that on new units, reports General Home Appliances, Inc., of Miami, Florida. In other words this firm trades back one old refrigerator for each fifth new one sold. Instead of cutting the profit on the new business, however, the "trades" have proven to be money-makers on their own account. In fact, they return a gross profit 5% higher than do new refrigerators. And the demand greatly exceeds the supply.

"Price-conscious buyers," says Jack Webb, the company's president, "represent a sizeable portion of our potential market. Disregarding attractive 'terms,' these purchasers consider first cost more important than the pride of original ownership, and to this class of prospects, our method of merchandising used units seems to make a strong appeal."

Sales resistance on the part of these buyers to any "second hand" article, according to Mr. Webb, usually focuses on two factors: appearance and condition. He eliminates resistance on these two points by removing the cause. Traded refrigerators receive a first class reconditioning inside and out; looks and mechanism get equal attention. When offered for sale, they look like new and are guaranteed as to mechanical condition for a period of 90 days.

Mr. Webb considers the reconditioning of traded units important enough to warrant his personal supervision. A competent mechanic, employed for that purpose, makes all necessary repairs in preparation for resale and on used appliances sold under guarantee. All refinishing is done outside on a flat rate basis at shops, which specialize on this type of work, experience having proved that this method is less expensive and more satisfactory.

Unless there are enough jobs ahead to keep him busy all the time, a first class refinisher is too costly an addition to the payroll. Then too, good workmanship requires equipment too bulky for practical use in a downtown location where rentals are high. Ample air pressure for one thing, according to Mr. Webb, is a necessary prerequisite to proper spraying results, unobtainable with small portable outfits.

As soon as a trade-in is received, it is checked over and a report made to Mr. Webb, who issues detailed reconditioning instructions. Gaskets are replaced and mechanical parts are thoroughly overhauled and tested for performance. Bright finish hardware is removed and goes to an electroplating shop for a chromium replating job and trays and shelves are retinned. When reassembled, the unit makes its trip to an "appliance beauty shop" for a major job of "face lifting." Badly rubbed spots on the porcelain interior are touched up.

These various operations add up to an article of merchandise, which, placed on the display room floor, has all the appearance of new stock.

Ranges and other major appliances, traded or repossessed, receive the same reconditioning routine as do refrigerators but the volume is small. Ranges, for instance, run only 5% of total sales.

Depending on type and condition, the cost for a mechanical overhaul of a used refrigerator averages between $5 and $10. Refinishing, on which size is a consideration, varies from $5 to $12. Trade-ins sell for enough more, however, not only to return the amount of money invested, but to pay a generous profit besides.

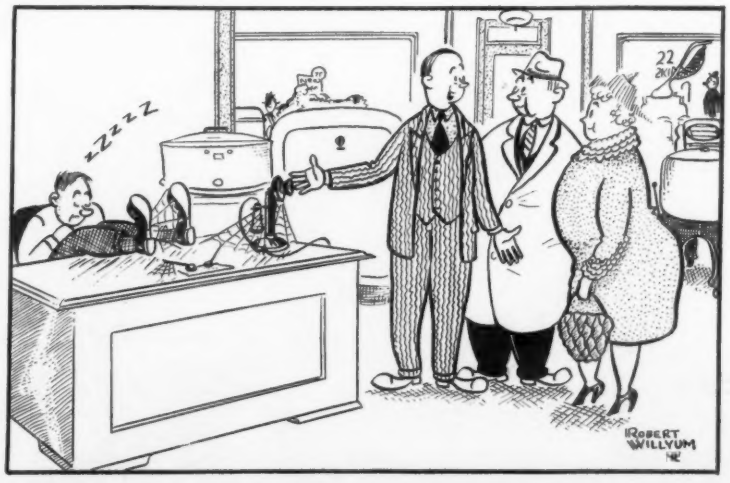
"Here is a used refrigerator to be delivered to the customer today," said Mr. Webb, pointing to a four cubic foot box on which even the name plate had been replated. "We spent just under $2 for overhauling, $2 for retinning, and $5 for refinishing the exterior. In this case, the resale price exceeded our total investment, including allowance, by approximately 40%."

On another and larger box, $10 had been expended. The "mark up" was in the same ratio.

General Home Appliances has developed a consistent demand for reconditioned units. If it temporarily catches up with the supply, a few two-line advertisements, sprinkled through the classified sections of local newspapers, never fail to bring immediate results. In these ads the firm telephone number is given. As a first urge, many "bargain hunters" prefer to deal with owners rather than with dealers but, once contacted, they often become interested in what the latter has for sale.

General Home Appliances, Inc., has demonstrated to its own satisfaction that its method of merchandising used appliances helps rather than hinders its promotion of new units. The majority of

(*Continued on page* 62)



"There's living proof that our appliances are all we claim them to be. That's our service man!"

Effective Parts Stock Control Reduces Service Expense

By J. O. Kimrey

Durham Public Service Company
Durham, N. C.

SINCE repair parts are such an essential element in the successful operation of any service department, I believe that they rank second only to a well-trained service personnel.

To render the best service possible with the least inconvenience to the customer is the one fine thing the service department can do to establish and retain customers' good will. In order to render this kind of service, it is very necessary to maintain an adequate stock of service repair parts for the various kinds and types of appliances used by the customer. By 'adequate stock' is meant that parts ordinarily required in service work should be available without undue delay. We all recognize that unusual cases require special handling.

I would say that there are three elements involved in the control of an adequate stock: first, intelligent buying; second, accurate records of items in stock; and third, issuance of parts from stock. These three elements of control are so closely related that inefficient coordination often means the difference between an inadequate parts stock and a superfluous parts stock.

Intelligent Buying

As the first element in maintaining an adequate stock, let us consider "intelligent buying." In our company it is the practice to have the service clerk write all requisitions for the purchase of service repair parts. These requisitions are subject to the approval of the department head and to the final approval of the executive head of the Operating Division. Our company does not have a purchasing department. You probably have the question in mind as to why the service clerk should be selected to handle the detail of buying service repair parts. To explain this requires a brief outline of our procedure in the handling of service orders.

All incoming telephone calls relative to service are received by the service clerk. It is his duty to obtain as much information as possible as to the nature of the complaint, kind of equipment requiring service, and urgency of the call. This information is supplemented by the records in the service department covering customers' appliances. The service clerk is then able to more specifically instruct the service man. The service man in turn knows what parts to carry to handle the call without an extra trip to the shop.

The service clerk dispatches all service orders and receives them upon completion of the work. By this arrangement the service clerk is acquainted with the nature of the call, the remedy, and what parts were replaced. This information is a very definite help in the ordering of parts, in that it serves as a guide as to the quantities normally required in the handling of customers' calls. In line with this procedure, it seems logical to us that the buying should be handled by the person best informed as to our needs, and this person is the service clerk.

In many cases major appliances are made up of numerous parts. To have a fair knowledge of the mechanical make-up and the function of the parts being ordered reduces the possibility of errors in ordering. Most manufacturers furnish repair parts bulletins which tend to further eliminate errors in ordering. It is our practice, if at all possible, to furnish the part number and description of the parts needed, and frequently we give the data of the appliance on which the parts are to be used. Errors in ordering are expensive. Clerical work in connection with the order is wasted, transportation costs have to be absorbed, reordering is necessary, the customer is inconvenienced, and if the appliance is inoperative, revenue is lost. It is not unusual that a distributor will make a charge for restocking items which are returned because of errors in ordering. Errors in ordering may be covered up temporarily by allowing these misfit items to go into stock, where they will remain to build up a stock investment which is absolutely worthless from a service standpoint.

No saving is to be effected by buying in quantities to secure maximum discounts unless actual experience indicates a need for such quantities. A slightly higher unit cost with a frequent turnover of parts would indicate a more healthy condition of the control system. Too often a large stock investment is built up by obsolete parts caused by buying in quantities greater than the need would justify. Therefore, to buy intelligently requires a most conscientious effort to avoid errors in ordering, a keen sense of normal requirements, and alertness to changing conditions.

Careful Accounting

The second element of controlling repair parts is the detail of keeping the stock. Accounting for parts in stock is a responsibility of the stock department, which operates separate and apart from the service department. In control of stock, it is necessary to know what is in stock, where it is, and what it costs. To know what is in stock eliminates the ordering of additional parts which would cause

an overstock. It also tends to prevent depletion of stock items normally required. To know where the parts are allows for a more frequent check on items most often used. The greatest advantage, however, is that the time lost in hunting for an item in stock can be eliminated. This lost time often includes the service man waiting for the stock clerk to find the necessary parts before answering a service call. Since some service orders require that the service man collect for the work upon completion, it is often necessary to know the cost of such parts as are used.

To obtain the advantages as outlined above, our company has a set-up as follows:

The stock clerk receives all shipments made to our company. Before these items are placed in stock, each one is properly identified with manufacturers' part number, name of part, and cost. Storage is so arranged as to provide separate compartments for each item, but grouped with parts of like nature as close to related parts as possible. This arrangement assists in the ready location of parts for the service man or customer who has only meager or incomplete information as to the parts wanted.

I believe a simple illustration will more clearly convey the idea. Let us assume that the customer has attempted to repair the door lock on his refrigerator and he finds the spring is broken. Naturally, not being familiar with part numbers or other information needed to identify the spring that fits the particular type of lock on his particular type of refrigerator, he merely brings the pieces of the broken spring as a sample to get a new one. By having all door lock springs grouped it is relatively simple to locate the proper spring promptly. That kind of service registers favorably with the customer.

We have in our stock approximately 1800 items of repair parts for ranges, refrigerators, water heaters, washing machines, well pumps, and small appliances such as percolators, fans, toasters, etc. We have experienced more difficulty in storing the smaller items than in storing the larger ones even though the smaller parts require a smaller amount of space. The most satisfactory method we have found is the rotary type of storage bin. This type requires small floor space and has adjustable compartments that may be altered to meet changing conditions. At present, we are using three units that require a total of approximately 27 square feet of floor space, and separate compartments are provided for 908 separate items of repair parts.

As the last element in controlling repair parts, it is necessary to know what parts have been released from the stockroom. All parts released from the stockroom are by requisition card only, and signed by the person securing them. If the service man requisitions parts for the re-stocking of his truck, the card will so indicate. If the parts are for some particular job, he indicates on the card to that effect. The service man is held responsible for items issued to him and is required to show on his service order what parts were used and for whom.

To hold the dealership for several makes of ranges and several makes of refrigerators carries the added responsibility of having a parts stock sufficient to render service on all of them. Since parts are rarely interchangeable between the different makes of ranges and the different makes of refrigerators, it would naturally follow that a greater number of parts would be required in stock. This has been our experience. At one time we held the dealership for two makes of ranges and three makes of refrigerators. At present we sell only one make of range and one make of refrigerator. From the service point of view, this arrangement offers certain advantages such as a more simplified stock with a smaller investment, and relieves the utility of some responsibility in connection with service work on foreign equipment. Regardless of how many or how few makes of ranges or refrigerators you sell, the one big concern is repair parts control. Only through some system of intelligent buying, accurate stock records, and a careful check on items released from stock will you have your stock under control.

The procedure as outlined in this article has been used by our company for some time, and while it may not be the ultimate in simplicity or effectiveness, we feel that it has been a factor in decreasing our repair parts stock investment per customer from 68 cents to 53 cents in 15 months.

This Dealer Didn't Listen To "Poor Market" Talk

(*Continued from page* 11)

the suggestions of the manufacturer. The firm does not employ an expert window designer but the salesmen have learned enough about it that with the manufacturer's pointers, a good design can always be made.

Mr. Ritterman believes that the window display should be a complete sales talk in itself with cards written to explain every feature of the washer and other cards urging on the passerby the reasons for buying a washing machine, relief from drudgery, etc. The explanations of parts and features, plus a convincing note on their convenience, are frequently pasted on the glass with tape running from them to connect with the part mentioned, while the other cards are arranged along the floor.

The washer is put about halfway in the window so that it will not loom so large as to blot out the cards ranged on the floor and so that it will not be too small to attract attention.

The Music Mart arranges its display of washing machines so that complete emphasis is placed on the machine, so that attention is not detracted by countless small items which could not be explained but which would be in the way. The window display is considered a sales argument and no salesman worthy of the name would abruptly launch into an argument concerning the merits of three wholly unrelated products. He would know before hand that he would sell none of them that way, but if he urged the merits of one product at a time on the prospect, he would stand a good chance of making a sale.

Both dealer and manufacturer newspaper advertising are used to push the product. The advertising has a two-fold value. It brings in immediate prospects and it fixes the name of the machine so well in the mind of the public that prospects will be made for the future. Many radio corporations have succeeded in doing this so well that the prospective radio buyer often knows exactly what model he wants and what make before he ever sees a salesman. The Music Mart is trying to do that with its washing machine.

It cultivates all classes and finds

(*Continued on page* 61)

Rural Wiring Sales

Full time solicitors pay their way with this Texas contractor

BY working closely with the local office of the Rural Electrification Administration and complying willingly in every respect with REA requirements, The Trotter Electric Company, Jacksonville, Texas, recently sold more than 200 wiring jobs to farmers on a contemplated rural electric line—five months before the line was completed.

What was even more important than selling these 200 wiring jobs, thinks L. M. Trotter, head of the firm, was the company's not only learning what electric appliances these 200 rural electric customers wanted but gaining a distinct advantage toward selling them as soon as the line was installed.

Mr. Trotter employed two salesmen to devote their time entirely to the sale of rural electric service and surveys until the job was completed. They not only were familiar with the wiring needs of rural homes but they knew all the details governing REA specifications, financing and so on, so that they were able to render a real service to prospects by way of advising them on financing and adequate wiring needs.

Knowing the strict requirements of REA financing, the salesmen were able to persuade most prospects that the wiring should be done by experts and should not be attempted by the farmers themselves or others who were not familair with all types of wiring and wiring specifications.

Appliance Needs Surveyed

Not only did these two salesmen make a survey of each farm home and premises sold to ascertain the actual wiring needs but they talked at length to each farmer and his family about their appliance wants.

"Although we did not take orders for appliances at this time," Mr. Trotter explains, "we did make a survey of each home to be wired and talked to each owner and his wife, to ascertain what appliances these new electric current users would buy when service was available. Not only did we ascertain their wants but we checked their buying power so that we would know, at the proper time, just how many and what appliances to push and recommend."

Naturally having contacted the prospects and having learned what they need in the way of appliances did not mean sales in all cases, Mr. Trotter emphasizes, but it did give the company the "inside track" when service was about to be available, because the appliance salesmen who were sent out to talk appliances knew ahead of time what the prospects wanted; and the prospects were favorable to the Trotter organization because of the wiring service and the contacts connected with it.

Incidentally, a tabulation of preferences of farmers and their families revealed information of real value to the company in future appliance selling to rural power users. Tabulations from the 200 odd farmers who contracted with the company for wiring showed preferences among rural users for appliances.

More rural people gave as their preference an electric refrigerator than any other electric appliance; second most important item in demand, or second choice with most persons, was the water pump.

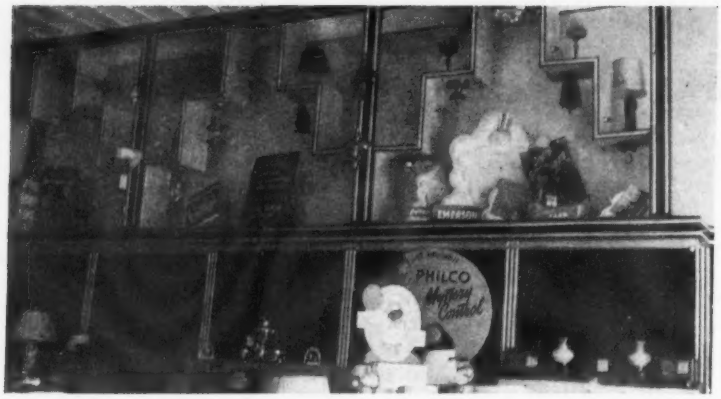
Many other appliances were named at or near the head of the list by some rural users; and most users named smaller appliances as being definitely on their buying list as soon as electricity was available.

Diversified Business

Mr. Trotter does not confine his wiring soliciting activities to rural work alone but promotes better lighting and adequate wiring continuously. It is said that there is not a single old-fashioned electric drop light remaining in the city of Jacksonville, mainly because of the aggressive selling of the Trotter Electric Company.

By realizing that business is where you find it and that the most logical place to find it is right at your own doorstep, the Trotters have built an original "hole-in-the-

Two full time rural house wiring solicitors serve to keep the Trotter Electric Company, of Jacksonville, Texas, working at capacity. The company recently sold more than 200 wiring jobs to farmers on a contemplated rural electric line five months before the line was complete.



This attractive fixture display, installed in the Trotter Electric Company sales room, has done a great deal to boost the sale of lighting fixtures and lamps. The staggered shelves upon which the fixtures are mounted occupy a space between the top of the regular wall display cases and the ceiling. The bottom of the ledge is about 6½ feet from the floor. The display extends around the sales room.

wall" shop of 20 years ago to one of the most modern and attractive electric stores to be found in the Southwest.

Mrs. Trotter runs the office and does some of the buying, especially in fixtures. Mr. Trotter spends four-fifths of his time outside, selling and supervising contract jobs. He has won four "Sales Leader" awards from the manufacturers of the refrigerator the firm carries.

He goes after electrical contracts on major construction jobs in his territory, but he is constantly on the alert to sell a residential rewiring job; and that fact is significant.

"I believe I know, in at least a general way, what sort of wiring there is in every home and business building in Jacksonville," Mr. Trotter declares. "So I know who are prospects for additional wiring and who may be within the next few years. When there is not enough business in the shop to keep the men on the jump, I go out and make a number of calls on home owners, whom I know to be potential buyers of additional wiring."

The firm recently completed the third rewiring job in one home in Jacksonville over a period of 20 years. Knowing the condition of the wiring in the home, the family's desire for modernization in its home furnishings and general outlook, Mr. Trotter knew about when to go back to the owner and suggest additional outlets and other modernization features. Consequently, he has done three jobs of wiring on the home, even though each job was strictly modern when it was completed.

"The new appliances that have come on the market during the past few years, plus the strong selling campaign of the lighting companies on the importance of adequate lighting, have created a demand for additional outlets in homes that were ultra-modern in wiring just a few years ago," Mr. Trotter declares.

Equally as productive in small but profitable jobs as local homes are local business houses, Mr. Trotter finds. Merchants are modernization-minded now, too, and this state of mind means profits for the local electrical contractor who will make it his business to become familiar with the wiring of all local business establishments.

Knows Customer's Needs

As a typical example, he called recently on a local department store owner. He knew that the display windows of this store were well lighted, because he had done the lighting job himself. At the time he installed the new lighting for the windows, several years ago, Mr. Trotter had suggested time switches for the windows. The merchant at that time did not want them. Mr. Trotter had reason to believe that the merchant's views might have changed by now. He called on the merchant and in five minutes had sold him on the idea of having time switches installed to control his window display lights —a comparatively small job but a profitable one.

"Store lighting becomes obsolete quickly nowadays," Mr. Trotter says. "New outlets are needed in many business establishments that were considered adequately wired only a few years ago. I know the wiring in every store in town and know what merchants are most likely to be persuaded to buy additional wiring and lighting. I call on these as time permits and manage to keep a fairly steady lineup of small jobs on hand at all times."

Although in a small city, Mr. Trotter does not permit that fact to frighten him when it comes to going after major contract jobs. He recently completed the wiring on the new Nan Travis Hospital in Jacksonville, Texas, at a cost of more than $5,000; and the contract was obtained in face of strong competition. Nor was his the lowest bid submitted.

He finds that consistent contact with local businessmen and home owners helps the firm indirectly in selling major contract jobs because this impresses those who have to do with letting the contracts that the company not only is efficient but on the job and modern in its dealings and methods.

Mr. Trotter is able to do most of the selling that brings $40,000 worth of business into the shop and store yearly by knowing intimately his field and through the co-operation of his workmen. These men are trained to watch for prospective wiring jobs and opportunities to sell appliances, when they make repairs of any type in a home. The men are supplied with convenient cards to make such reports. When a man is sent to a home to repair a washing machine, for example, he scans the home for the absence of needed appliances, inadequate wiring, the need of new outlets and the presence of old appliances. He writes down the name of the householder, the address and comments as to his estimation of additional electrical needs in the home.

Mr. Trotter likewise keeps his eyes open for appliance prospects when he checks a home for rewiring or additional outlets or when he repairs a refrigerator or major appliance which he personally services.

"There is more business than any local dealer-contractor possibly can do, right in his own town, regardless of how small the town is, if he will keep his eyes open for additional sales and follow up the leads he thus obtains," Mr. Trotter declares.

Understanding and Using the National Electrical Code

By B. Z. Segall

New Orleans Public Service, Inc.
New Orleans, Louisiana

EACH service or set of service entrance conductors has to be provided with an approved service entrance switch or circuit breaker. This service equipment must perform two functions: (1) It shall provide a readily accessible means of disconnecting all the conductors from the source of supply; (2) it must offer overcurrent protection to the service.

The requirements for the first function are covered in sections 2351 through 2359. These will be discussed in this article. The overcurrent rules are included in sections 2371 through 2375, and these requirements will be outlined in an article scheduled for the March 1940 issue.

Before going into a detailed explanation of the disconnect requirements for services, it is well to keep in mind one pertinent fact. The use of a switch combines both the disconnecting means and the overcurrent protection by virtue of the switch and fuse, respectively. The two are usually built into one enclosing cabinet but may be separate units if properly designed and approved for service entrance equipment. A circuit breaker, however, is an inherent combination of disconnect and overcurrent device.

Four general rules apply to the disconnecting requirements of a service. In the case of a single occupance building or residence, under certain conditions, the disconnect does not have to control the entire supply. First of all a maximum of six switches or circuit breakers may be used in place of one main disconnect. Each of these separate switches or circuit breakers, however, must be approved by the Underwriters' Laboratories for service equipment. The six or less disconnects must be grouped together at a readily accessible location near the point where the service conductors enter the building. These disconnects may be located inside or outside the building, and if installed outdoors must of course be designed to operate safely when exposed to weather.

It is important to note that all six disconnects, while they must be grouped at one location, may be installed in one common enclosure or in individual cabinets. It is also important to note that there is no limit as to size. Thus, six or less, thirty-ampere switches may be used for a serivce without a main switch under the above conditions as well as six or less five thousand-ampere circuit breakers. A customer may install one switch and related service equipment to serve all of his lighting load, a second to control his power load, a third for an air conditioning equipment service, a fourth for an exit emergency system. All of these may be installed without one main switch ahead of the four subdivisions of his service, provided they are all grouped at one location and are all readily accessible.

IN this ninth article of his series on the Code, Mr. Segall continues his discussion of the requirements relating to services, covered in Article 230. Other articles in this series have appeared in foregoing issues, beginning in April 1939.

The second general rule deals with multiple occupancy buildings. For a multiple occupancy building or residence the above general principles apply. However, one consideration that must not be overlooked in applying this general rule to multiple occupancy is that each customer must have access to his disconnect at all times. A question often asked is whether or not each subdivision of service may be further subdivided under this rule. The code (section 2351b) is quite definite on this point. A main switch does not have to be installed if six sets, or less, of service entrance conductors are installed at a common readily accessible point for a multiple occupancy building. One set of service entrance conductors may be tapped for six or less sets of service equipment at a common readily accessible location without installing a main switch in the main service entrance conductors. No matter how the

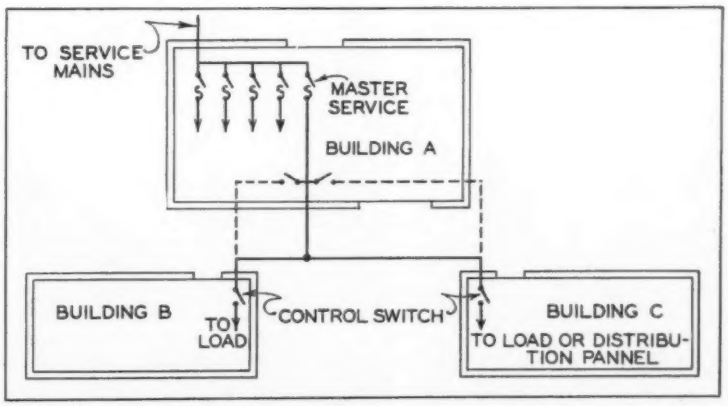


Fig. 23. In this installation, a subfeeder, fused and switched at the master service, takes care of the load in buildings B and C. These two buildings must have individual control switches, as shown.

service may be subdivided, more than six disconnects will require one main disconnect ahead of these various sub-sections of the service.

The third general rule deals with the grounded conductor. It is required that some means be provided by the switch to disconnect the neutral line from the source of supply. Many types of disconnects provide a neutral bar with solderless or soldered lugs on both ends of the bar. The main intent of the rule is to arrange some means, either with neutral bar, separate switch blade, or other approved construction, for opening the neutral line without resorting to cutting this wire in two.

Rule for Several Buildings

The fourth general rule is but a cross reference to the requirements for master services outlined in the general service rules under section 2306. This refers to the installation of disconnects and overcurrent protection at the point of service entrance in other buildings being fed from one master service or the installation of these control switches or circuit breakers at some other accessible central point. Figures 23 and 24, illustrate this point.

Figure 23 shows a sub-feeder fused and switched at the master service to take care of the load in buildings "B" and "C." These two buildings must have individual control switches as shown. If the wire size is not changed throughout the entire feeder then only disconnects are required at the service entrance points to buildings B and C. Thus a 15-ampere branch circuit may be extended from the main house building A to take care of the outlets in garage building B and storage shed building C. The 15-ampere fuse in the master service equipment in building A would offer proper fuse protection to the entire branch circuit.

In buildings B and C, therefore, it would only be necessary to install 30-ampere disconnecting switches. These two switches could be installed in building A as shown by the dotted lines and it would not be necessary to install any switches in buildings B and C. Or it would be possible and permissible to install three-way switches in all buildings so as to provide two point control for the service in buildings B and C respectively. It is also permissible to install distribution panels in buildings B and C if further subdivisions of the subfeeder are needed to feed branch circuits, as would be required for a group of factory buildings. The main switches, however, would still be required for buildings B and C. This discussion, of course, is based on the premise that all buildings are under one management and control.

Figure 24 shows another method of applying the master service rules. Here the sub-feeders are centralized at the master service location. No other switches are required for control of the service to buildings B and C. Distribution panels may be installed in buildings B and C at the point of service entrance as in the case discussed in Figure 23. In the case of buildings B and C being small buildings, such as a garage and storage shed for a residence, it may be feasible to supply two point control for both buildings by installing three point switches both at the master service location and in buildings B and C, respectively. Here also the discussion applies only if the buildings are under one management and control.

The general rule requires the disconnect switch to control all circuits connected to it. However, this is not always a desirable thing from the standpoint of control equipment and metering. The main switch very often is opened and if time switches control circuits or the potential circuits of demand meters such as the Lincoln meter are thus interrupted, the operation of these devices would be impared or incorrect. These circuits are usually high impedance shunt circuits, i.e., connected directly across the line, and in the event they would short out, would not generate enough heat to cause any damage.

Timing Circuits Excepted

It is essential that the control circuit, usually feeding the timing motor of a time switch, be in operation at all times to assure proper time sequence of "off" and "on" operations of the switch. The potential circuit of the Lincoln demand meters requires about 10 hours preheating, i.e., connection to the line, before it will register properly and accurately. Because of these conditions of operation the circuits feeding these coils, etc., may be connected on the line side of the service disconnect. The wiring for these circuits, however, must conform to the requirements for service entrance conductors. This exception is outlined in section 2352.

The disconnect may be constructed to open all its blades on contacts simultaneous or individually. Individually opening blades or contacts may only be used for a three-wire d-c system, single-phase circuits, or polyphase lighting installations. Of course, this applies to the disconnecting of the ungrounded conductors only. The rule (section 2353), therefore, requires all polyphase disconnects, except those feeding lighting feeders exclusively, to disconnect all ungrounded conductors simultaneously. A polyphase motor, once it has been started, continues to run if supplied only with a single phase source of energy. The motor, however, will heat up and be damaged very quickly under these

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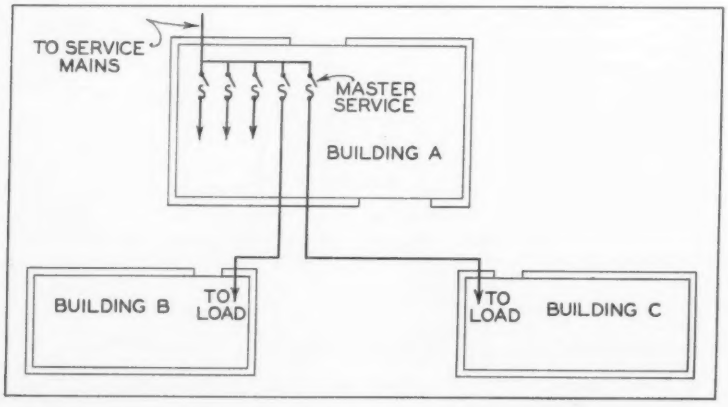


Fig. 24. Another method of applying the master service rules is shown here. Subfeeders are centralized at the master service location and no other switches are required for control of the service to buildings B and C. Distribution panels may be installed in buildings B and C at the point of service entrance as in the case discussed in Fig. 23.

Irregular Fixture Spacing In Unusual Installation

LIGHTING contractors might find an inspiration for the development of new business from men's clothing stores in the lighting installation at Clarke's Clothiers, in Tulsa. The installation is a somewhat radical departure from the conventional, being designed for a specific function, rather than for distribution of a certain foot-candle value of light throughout the store.

Furthermore, the Clarke installation is principally an execution of the ideas of Harry Clarke, the owner. Not that Mr. Clarke attempted to tell the lighting engineers their business, but he did insist that he wanted the maximum amount of light directed upon his displayed merchandise and he wanted certain effects to build up color to natural value.

On the basis of long experience in the clothing business, Mr. Clarke insisted that his requirements could not be filled with a general distribution of light throughout the store and there followed considerable discussion and experimentation by the owner, Jack Whitener, the contractor and D. J. Frandsen, consultant for the Public Service Company, before they made this installation:

Irregular Spacing Used

Each counter that displays merchandise is lighted from above by an individual recessed unit in the ceiling. For the larger areas, 200-watt lamps are used and for the smaller counters the wattage is 150. This results in an oddly irregular pattern of light spots on the length and breadth of the ceiling, but since there is no glare at either source or destination and since the merchandise counters are thus brought boldly into prominence, the irregular ceiling pattern is an inconspicuous element.

Equally prominent feature of the installation are ten mercury vapor bays, each with a light strength of 250 watts, five to each side of the store and located immediately above the wall cases. The mercury vapor blue is mingled with the white light to build up colors, but this technique is not suspected by the average customer. Customers are intent upon examining the merchandise and it is generally their casual impression that the mercury vapor bays are recessed windows admitting sunlight.

In the shelved glass showcases, conventional lighting methods are used and the conventional fixtures for diffusing light are employed in the clothing department, where suits are tried on. But in the clothing racks and in the hat cases, conventions are again ignored. Neon tube lighting for both suit racks and hat cases has proved quite satisfactory, emphasizing colors and minimizing heat.

There are several points of significance in connection with the Clarke installation. Strangely enough, without the knowledge of the Tulsa merchant or his advisors, several quite similar jobs were installed in the east at about the same time, the technique seeming to be a natural development in the search for improvement. Already the Clarke job has been copied in Fort Worth and Little Rock.

Then there is the significance in the viewpoint of the merchant.

"When I was ready to remodel on a permanent basis," Mr. Clarke said, "I decided that I wanted a lighting system that would put the light where I need it, on the goods I have to sell.

"In reviewing my years in the clothing business and the various lighting arrangements that had been employed in the different locations I have occupied, the fact struck me forcibly—my light had never been efficiently directed on my merchandise.

"My lighting installations had been average, which, to me, means there was a vast amount of illumination on the ceiling, which made my lighting more decorative than serviceable. I have nothing on the ceiling that is for sale.

"This new lighting system, in which the recessed lights are the principal units, gives me a soft and focused light directly on the merchandise, restricted almost to the exact area of each particular display. We don't even need maximum light in the aisles, so we don't worry about the fact that the aisles are shadowy.

"The combination of the soft light and the diffusion from the mercury vapor bays brings up and

(*Continued on page* 60)

This unusual lighting installation in Tulsa, Oklahoma, was designed with the idea of placing the greatest amount of light on the merchandise. The recessed lighting units are scattered about in positions where they can best focus their light on merchandise displays. The bright bays along the side walls house concealed mercury vapor lamps. The blue light from these lamps, blending with the white light of the recessed fixtures, provides a general illumination closely approaching that of daylight which helps customers in their selection of colors.

A hard working group this, the Electrical Committee of the National Fire Protection Association, which considered and took action on scores of changes proposed for the 1940 Code.

1940 Code Proposals Studied By Electrical Committee

AT long last, a number of controversial revisions proposed for the National Electrical Code have been disposed of—at least for the time being—through the action of the Electrical Committee, of the National Fire Protection Association, at its recent meeting in Atlantic City.

Considering one of the most voluminous agendas ever placed before it, comprising more than a hundred printed pages, the Committee carefully weighed proposals for Code changes that have accumulated since the 1937 revision of the Code was released. Many of the changes proposed in the Article Committee Reports were approved; several were voted down; and in a few instances action was taken on revised proposals not previously published.

New Code Expected in Summer

For all practical purposes, the decisions of the Electrical Committee are final but before these can be incorporated in the revised 1940 Code, they must receive the approval of the National Fire Protection Association, which meets in May 1940. Following approval of NFPA, the revised Code will be submitted to the American Standards Association for approval as an ASA standard. It is anticipated that the new Code will become effective, and copies made available, sometime during the summer of 1940.

A more detailed account of the changes becoming effective in the 1940 Code will be published in these pages at a later date but the following paragraphs describe some of the changes that have received considerable discussion in chapter and section meetings.

A considerable revision, representing one of the most important changes in the current Code, was approved for Article 210 on Branch Circuits and Article 220 on Feeders. In general, the watts-per-square-foot basis for the determination of branch circuits has been extended so that it now includes, in addition to dwellings, many of the more common types of installations such as stores, schools, office buildings, hotels, etc. These articles, as revised, parallel very closely those recommended in the tentative supplementary reports of the Article Committee for Article 210 and 220, published in the September 1939 issue of ELECTRICAL SOUTH.

The color coding of multi-wire circuits, as required by Article 210, has been changed slightly, and a blue wire in place of a yellow wire is required for 4-wire circuits. The change was brought about because the yellow wire becomes soiled during installation and is often confused with the white neutral wire. Color coding has now been extended, and all conductors of the same color must be connected to the same feeder.

Outlet Requirement Clarified

The rule on receptacle outlets, included in Article 210, has been continued, but it has been clarified and liberalized. A receptacle outlet will be required for each 20 feet "or major fraction thereof." This rule also has been strengthened by the requirement of a No. 12 circuit to supply the heavily loaded outlets in kitchens, pantries, dining rooms, etc.

The branch circuit rules in general have been extended to include and provide for circuits for appliances, these being formerly han-

dled in Article 422, Appliances. This should prove to be a more convenient and logical code arrangement.

Section 2113 of the 1937 Code, which covers the use of a common neutral for branch circuits, will not appear in the next edition of the Code.

Radical Change in Art. 220

Of much interest to both electrical contractors and inspectors is the change in Article 220 on feeders which greatly simplifies the calculation of feeder sizes. Heretofore, it has been necessary to make a complete computation of the load in order to design the feeders. With the new arrangement, the load calculations used to determine the number of branch circuits can also be used in determining the size of the main simply by applying a new set of demand factors.

Few important fundamental changes were approved for Article 230 on Services. However, the language of many sections has been revised in an attempt to clarify those sections which have given trouble to those who apply the Code. A new requirement has been inserted in this article which provides for a 36-inch clearance of service wires that might be accessible from porches, windows, etc. In section 2325, provision has been made for service connections on low buildings of the bungalow and similar types.

One of the most extended discussions of the meeting centered about the subject of non-tamperable fuses covered in the report of the Article 240 committee. The final action of the committee makes the use of non-tamperable fuses mandatory after November 1, 1941. The revised article does not require that the fuses, fuseholders, and adapters of different manufacturers shall be interchangeable but specifies that they "should" be interchangeable.

However, the Electrical Committee recognized the desirability of having interchangeability in these fuse parts and appointed a special committee of five to consult with manufacturers and the Bureau of Standards in an effort to develop standards for tamper-resisting plug fuses that are interchangeable.

As finally approved, this article will permit the use of Edison base fuses for existing installations, and will permit non-tamperable fuseholder adapters without locking devices for old installations.

The report of the Article 300 committee brought out more discussion than any other Code article. As finally approved, this article gives recognition to the new rubber insulations designated as performance grade and heat-resistant grade. The new carrying capacities for both Code grade wire and the new insulations were adopted. However, the carrying capacity tables shown in the article committee reports preprint, when published in the Code, will not give carrying capacities for less than three wires in a conduit. A multiplier of .80 must be applied to get the current carrying capacity with 4 to 6 wires per conduit, and a multiplier of .70 must be used to find the value for 7 to 9 wires per conduit.

Recognition was also given to thin wall insulation, latex insulation, and synthetic insulations, these latter, however, being restricted to the rewiring of existing buildings where space is not available in raceways for conventional insulation thicknesses and where it is impracticable to increase the size of a raceway due to structural conditions.

The permissible conduit fill for conductors with thin wall insulations used for rewiring of existing raceways, was set at 40% for two wires, and 50% for three or four wires, representing approximately a 25% increase over fills previously allowed.

Bare Neutral not Approved

Recognition of non-metallic sheathed cable with uninsulated neutral, generally designated as "CNX," was not approved by the Electrical Committee. The Committee also voted against any further recognition of bare neutral wiring other than that now approved in service wiring.

Other changes approved for Article 300 include the following: Enameled conduits are limited in use and will not be approved outdoors or in the presence of corrosive vapors. Cellular floor raceways are given a new Code article. Surface wood raceways (wood moulding) will be deleted from the Code, as will cast-in-place raceways. Table 2 of the 1937 Code was amended to accept three No. 8 conductors in a ¾ inch conduit.

The recommendation of the Article 248 committee to recognize approved threaded fittings on electrical metallic tubing was not accepted by the Electrical Committee. Nor would the Committee approve the proposal to increase the allowable size of electrical metallic tubing and the size of conductors permitted. The Electrical Committee did give recognition to the use of electrical metallic tubing in elevator shafts.

Many Code articles not drastically changed were revised to a certain extent to clarify the requirements. For example, a complete rearrangement was approved for Article 250 on Grounding. The new arrangement takes a much more logical form and will greatly facilitate application of the Code grounding rules. Many similar clarifying revisions were adopted for Article 430 on Motors and Controllers.

New Motor Rating Method

Of special interest among the changes made in the latter article are the new tables adopted to indicate the maximum setting or rating of motor-branch-circuit protective devices. The maximum settings will be indicated by a Code letter and it is expected that manufacturers of motors will soon begin to mark certain motors with the identifying Code letters to facilitate proper application of overcurrent devices.

The requirements for hazardous locations have been somewhat modified in that the limitations in some cases have been drawn a little closer, particularly with regard to sealing off of conduit runs. For this article, also, open wiring on insulators will be recognized in storage compartments for combustible fibers.

Recognition is also given to certain types of cranes in which the track can be used as one leg of the circuit. An insulating transformer must be used for current supply.

As a result of the increasing use of X-ray and similar equipment in industry, Article 660 has been somewhat expanded.

The report of the special committee on the grounding of portable tools was presented in full to the committee. A code rule was adopted to require the grounding of portable appliances in other than residential occupancies where the appliance is likely to be used in damp or wet locations, on metal floors, inside metal boilers, or in similar locations. Recognition is given, however, to appliances operated from insulated transformers with ungrounded secondaries with voltages of less than 50 volts.

APPLIANCE Service

Proper Installation Reduces Water Heater Service Calls

By Allen Parker

CONTINUED improvement in electrical water heater design and construction has greatly reduced the service required by these appliances. Despite these improvements, though, the service engineer does get calls and, frequently, finds himself confronted with difficult problems, some of which will be discussed here.

Much needless service work can be eliminated by the sales department itself, if every salesman will endeavor to sell heaters of sufficient capacity to handle the purchasers requirements at the water temperature recommended by the heater manufacturers.

A few years back, heater tanks had short lives for a number of reasons, the main one being that the tanks were usually made out of ordinary iron with a galvanized finish that soon broke down. Another reason was that the customer usually purchased as small a heater as was thought to be sufficient for his requirements, and then as the convenience of hot water on tap began to be realized at its greatest value, the consumption went up. For the heater to meet this greater demand, the water temperature had to be raised. But raising the temperature to many people meant simply to give the adjusting screw on the thermostat a twist. This is indicated by the fact that so many new heaters are purposely purchased too small in order to save a small amount in initial cost; the additional capacity required is obtained by raising the temperature of the water.

Most heaters come from the factory with the thermostats set at approximately 150 degrees F. This is considered sufficiently hot for most purposes unless it is for sterilizing. And to say the least, water for sterilizing purposes as needed in the home is usually required in such limited quantities as to make it most worth while to use auxiliary heating methods for water to be used for this purpose. And needless to say, it would not be practical or safe to maintain water in the tank at 212 degrees, which is the temperature recommended for this purpose.

The main reason why the factory settings of thermostats is at about 150 degrees is that the life of the tank is prolonged when the temperature does not exceed this temperature. Oxidation of the metal in the tank takes place very slowly at 150 degrees or lower but deterioration rapidly increases above that setting. Most manufacturers now use tanks made of copper bearing steel for their regular line of heaters, this one improvement has considerably reduced the action of oxidization or rust and has materially increased the life of the heater.

Eliminate Carbon-Dioxide

In some localities a tank just does not last, even though operated at a low temperature, because of a chemical reaction of the water. This most frequently can be traced, after a chemical analysis, to carbon dioxide in the water. The presence of carbon dioxide in the water in proportions of fifteen parts per million or less is considered negligible; above that amount, it is likely to cause trouble; also, the water upon being heated may appear to be cloudy or muddy. Often the amount of carbon dioxide present may run as high as forty-five parts per million. Water of this type will usually be found only in suburban or rural homes where water is taken from an individual well. Water taken from city mains, in most instances, will have been neutralized by the municipal water works before it is distributed.

Individual wells which have a high carbon dioxide content can be greatly improved by depositing ground marble on the floor of the well to a depth of four to eight inches, depending upon the quantity of water in the well. The marble, being soluble, absorbs a good portion of the carbon dioxide. The ground marble will necessarily have to be replaced every four or five years as it eventually dissolves. Of course, most manufacturers have available for those customers who are willing to pay the additional price, water heaters with tanks that are made of monel metal, which carries a life guarantee of twenty years and successfully withstands the destructive corrosion of high temperatures as well as the presence of carbon dioxide and other unusual conditions.

Proper Furnace Connections

Another misconception of economy, in my opinion, both from an operating standpoint as well as an investment, due to the shortening of the life of the heater, is the practice of connecting an electrical water heater in series with the home furnace. A heater so connected should by all means have an auxiliary uninsulated tank connected between the electric heater and the furnace. The auxiliary tank to act as a tempering tank and cool the water off somewhat before it enters the electric heater. Otherwise, the same trouble will occur as when the thermostats are set too high, because of long periods of operation by the furnace with no control over the amount of heat put into the water. In some instances, it may even boil the water.

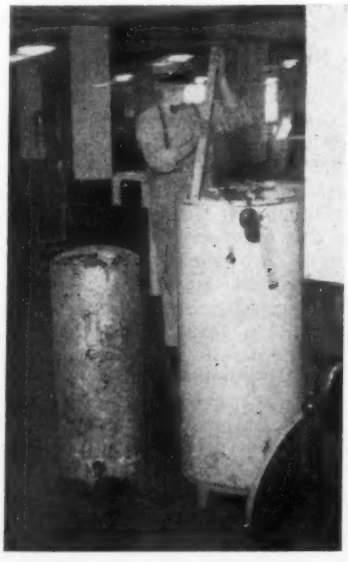
On water heaters connected in series with a furnace, it is good practice to install, not only a pressure relief valve, but also a temperature relief valve. Otherwise, the water may get hotter and hotter until the water turns into steam without generating enough pressure to open the relief valve. This is because as the steam expands it pushes the remaining water out of the heater back into the water mains, unless there has been a check valve installed in the inlet

to the heater.

Personallly, I would rather leave the check valves out of the water inlet, not only to reduce the cost of installation, but just in case the temperature and pressure valves did fail to operate when needed. (An exception to this would be on individual water systems such as used in rural communities where a failure of the water pump would cause the heater to drain).

Safety valves on water heaters do frequently fail to operate after they have been installed on a heater for a long period of time without operating. The most likely reason for a failure to operate is the accumulation of scale and corrosion around the seat and diaphram of the valve. That is why it is always best to install the relief valves in the cold water inlet. Although this is not a cure for corrosion forming in the valve, it does slow it down.

It is not uncommon to find many reputable electrical dealers who install their electrical water heaters with the cheapest relief valve that is available, and they feel that they have all the protection that is necessary. The most convincing proof to them that they are right is the fact that they may see the cheaper valve and the more expensive valve installed side by side for testing purposes, both functioning perfectly, one as well as the other. So they think, why spend the extra money for the more expensive valve?



Service for this water heater requires installation of a new tank. The insulation was removed and dried and is now being neatly packed back in place. Note how the old tank has rusted through and the discoloration of rust on the outside.

The secret is that when the valves are on test both are new and consequently operate perfectly. But once they are on the line for a good while, without operating, and then the emergency arises, it would more than likely be a different story, because the better valve would operate and the cheaper one may not. This would be because the scale and corrosion in the cheaper valve would have made it inoperative.

You may ask why the scale and corrosion made the cheaper one inoperative and yet did not affect the better valve. Or you may wonder if the better valve, under the same operating conditions, did not have the same amount of corrosion and scale form in it. The answer is that the better valve possibly is made out of the same metal and may have the same amount of corrosion form in it, but if you examine it closely you will recognize a difference in the physical appearance and size of the two valves, the better valve being the larger valve. The size in itself accounts for part of the price increase, for the cheaper valve must be made smaller and a sacrifice made in design and construction.

It will be found in almost every instance that the cheaper valve is operated by the water pressure being exerted directly against the seat of the valve, which is a very small area. Consequently, a very small amount of scale and corrosion forming around this small area will soon restrict its operation. However, the better valves are built with a round diaphram about three inches in diameter against which the water pressure is applied. The diaphram, with its large area, can hardly be made inoperative from scale.

To prevent chattering on the large valve, the seat is fastened to the diaphram through an auxiliary spring and pin so that once the diaphram has acted, then only a small amount of pressure is needed to open the valve seat. When it does open, it will flush away the sludge, scale and corrosion and be in better shape to operate next time.

A relief valve should always be installed on every automatic electric hot water heater. Yet it is only worth while if it operates when needed; a cheap valve may serve no useful purpose.

New Electrical Books

Household Electric Refrigeration

By John F. Wostrel and John G. Praetz. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 406 pages, 6 x 9 inches, 157 illustrations. Price. $4.00.

Complete information on how to install, service and repair household refrigerators is included in this practical manual for refrigeration service men, electricians, and others interested in the operation, construction, adjustment, and servicing of household refrigerators and their control devices. In non-technical language it covers refrigeration fundamentals and the various types of household units and systems, and gives practical instructions on service operations, how to diagnose and correct troubles, service shop equipment, motors, etc. It also includes a chapter on the gas absorption system of refrigeration.

The book includes descriptions and illustrations of many popular makes of machines, showing both the entire systems and details of parts, and emphasizing the basic points of construction and operation so that the reader can handle practically any type of machine he may encounter. Besides the step-by-step descriptive material, numerous charts and tables giving methods and reference information in handy form aid the reader in making practical use of this new manual.

Direct-Current Machinery

By Thomas C. McFarland, University of California. Published by International Textbook Company, Scranton, Pa. 439 pages, 5 1/4 x 8 1/4 inches, flexible cover. Price, $4.00.

This new textbook is designed for use in courses on direct-current machinery by students majoring in electrical engineering. The first chapter is devoted to fundamental concepts of electricity and magnetism because it is felt that this material is essential for completeness, and because in many schools a brief review of fundamentals from an engineering point of view is deemed essential before the study of machines is begun.

In treating of direct-current machinery an attempt has been made to present first a physical picture of the assembly of these machines, and some of the reasons why the proportioning is such as it is. This has been followed by a discussion of operating characteristics and control, proceeding always from the no-load characteristics to the load characteristics.

The author makes use of some material of a design nature, for he believes that if a student can be made to appreciate the compromises that are necessary in constructing machines he will understand more fully why machines behave as they do.

Each chapter is supplemented by a list of helpful references for further student investigation, and also by groups of practical problems designed to amplify the chapter content.

MOTOR Service

Connecting Diagrams for Lap Wound A-c Motors

Part 8

By A. C. Roe

Railway Motor Engineer
Westinghouse Electric & Mfg. Co.

WITH this article, we present the six-pole, two- and three-phase, single voltage, three parallel connecting diagrams, Figures 22, 23 and 24 arranged for the standard four and three leads. In addition, we will discuss how the short jumper parallel connections can be used with equalizer jumpers to reduce the effect of magnetic unbalance.

Most motor rewinders are familiar with the reason for using equalizer connections on lap wound direct current armatures. These connections join points that are of equal potential, and if an unbalanced magnetic condition occurs, current flows through the equalizers and tends to correct the unbalance. It was found that similar conditions could be obtained on induction motors by using a certain type of connection, and it is because of this corrective effort that some design engineers use a parallel connection of the short jumper type when designing a new winding.

Cause of Unbalance

A magnetic unbalance can occur in many ways, such as from bearing wear forming unequal air gaps, excessive side pull on the pulley, burned iron laminations fused together from a previous ground, or from coils cut out of circuit. In most cases, the condition can be corrected if more current can be made to flow into the weak spot opposite the over-magnetized section.

The series type of connection has no corrective effort regardless of whether the connection is of the long or short jumper type. The short jumper series connection has the groups arranged symmetrically around the winding, but otherwise there is no advantage as to corrective effect on unbalanced magnetic conditions. Nor will the long jumper parallel connection offer any advantage as the proper conditions cannot be made to exist as will be brought out later.

The desirable conditions are to have two groups, in the same phase and mechanically opposite one another, connected in a closed circuit so that the line voltage and counter electromotive force are related and will permit circulation currents of a corrective nature.

With the short jumper type, of parallel connections, there are two methods of arranging the pole phase groups into the two parallel legs. One method uses a short jumper between legs and, the second uses a long jumper between the parallel legs.

In Fig. E is shown one phase of a four-pole, three-phase parallel star connection, with short jumper between pole phase groups, that is, top to top and bottom to bottom, and a short jumper to connect the parallel legs. With this arrangement, one leg includes groups one and four, and a short paralleling jumper, K, drops back 1 and 4 group pitch to pick up groups ten and seven.

The schematic diagram in Fig. E indicates that groups one and four are thus arranged opposite groups 7 and 10. There is some slight corrective effort, as an unbalance at group 7 will set up circulating currents in the loop formed, but equalizer connections cannot be used.

In Fig. F which is also for a three-phase, four-pole parallel star connection of the short jumper type, only one phase is drawn in, but in this case a long paralleling jumper, D, is used to join the two parallel legs, so that one leg includes groups one and four; then a long jumper is used to reach half way around the winding to pick up the group in the same phase that is mechanically opposite to group number one. As shown, this jumper, D, picks up groups seven and ten.

Best Type of Connection

The schematic diagram in Fig. F shows that groups seven and ten are reversed from the arrangement shown in the schematic diagram of Fig. E. Then by adding the equalizer jumper No. 3 connecting together jumper No. 1 and No. 2, two paths are formed in each parallel leg so that any magnetic unbalance in group 1 or 4 will cause corrective circulating currents to flow through groups 4 and 10, jumpers No. 2, No. 3, No. 1 and the star jumper; or through groups 1 and 7, jumpers No. 2, No. 3, No. 1 and the D jumper.

Thus to insure the best connection when using a parallel type of diagram, use the short jumper between legs, and use a long paralleling jumper to join the two parallel legs, making sure that the second parallel leg is started on a group in the same phase but 180 mechanical degrees away from the group on which the first parallel leg is started.

●

THIS is the eighth article in a series that will present 45 modern connecting diagrams for two- and three-phase lap wound induction motors for use on four-, six-, and eight-pole windings.

A master table of the 45 diagrams was presented in the July 1939 issue together with the first three diagrams of the series. Three additional diagrams have appeared in each succeeding issue.

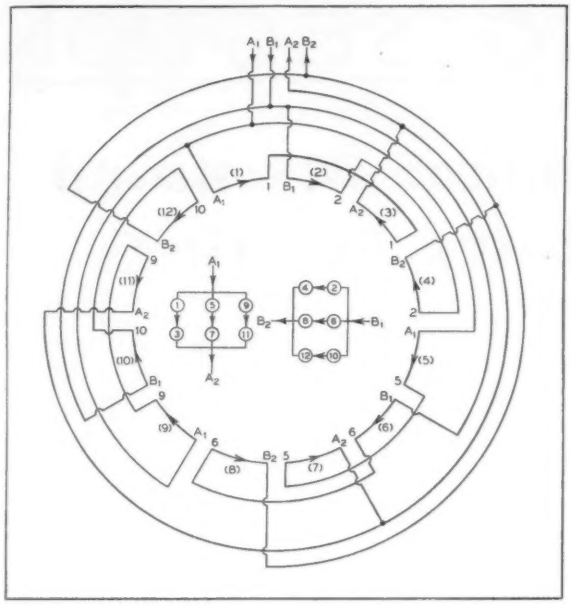


Fig. 22. Diagram for six-pole, two-phase, three-parallel connection, with four leads.

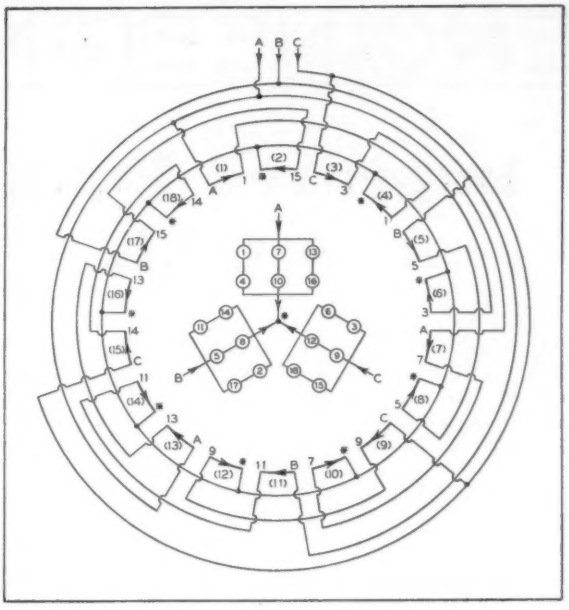


Fig. 23. Diagram for six-pole, three-phase, three-parrallel star connection, with three leads.

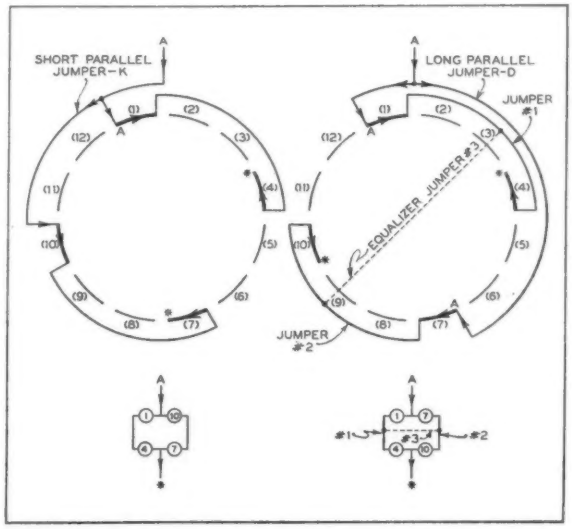


Fig. E. (Left) One phase of a four-pole, three-phase parallel star connection making use of short jumpers between pole phase groups. Fig. F. (Right) One phase of a three-phase, four-pole parallel star connection of the short jumper type which utilizes a long parallel jumper to join the two parallel legs. The connection in Fig. F is much more effective in correcting magnetic unbalance.

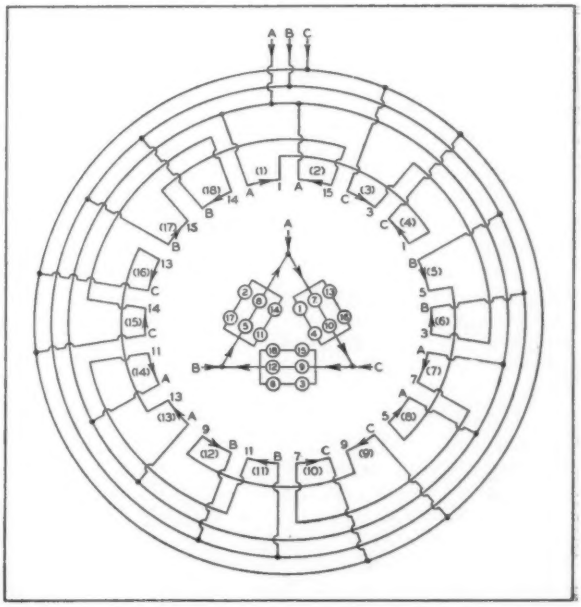


Fig. 24. Diagram for six-pole, three-phase, three-parallel delta connection, with three leads.

The bars of a squirrel-cage rotor winding of an induction motor, if of the low resistance type, act as equalizer bars and tend to produce corrective measures, but in extreme cases the corrective parallel connections on the stator, with equalizer connections, will be necessary to correct magnetic hum at unbalance.

The next article of this series will present the six-pole, six-parallel diagrams, Figs. 25, 26 and 27 and a discussion on how the coil leads are arranged to make the various types of stub connections used in different forms of winding.

(Many inquiries have been received asking if this series of articles is available in book form. At present, the articles are available only in monthly issues of ELECTRICAL SOUTH. A limited number of copies of previous issues containing these articles are available.)

ENGINEERING SECTION

Improved Equipment Discussed At A.I.E.E. Winter Meeting

A WIDE range of topics of specific interest to electric utility engineers were featured on the winter convention technical program of the American Institute of Electrical Engineers held in New York City, January 22-26. Special sessions were devoted to the subjects of lightning protection, circuit breakers, relays, power transmission, instruments and measurements, and insulation coordination.

"Lightning Protection of Wood Pole Lines," was the subject of a paper presented by H. K. Sels and A. W. Gothberg, both of Public Service Electric and Gas Company, Newark, at the session on Lighting Protection. Discussing the reliability of wood pole transmission lines during the lightning season, the authors pointed out that approximately sixty miles of line were reconstructed using the inherent insulation of a wood pole line with lightning protector tubes on one of three conductors. After two years' experience with this type of construction, lightning outages have been reduced better than 90%.

Lightning Protection

Protection through the use of lightning protector tubes, the authors reported, is dependent upon the insulation of the various structure assemblies, the resistance of the tube grounds, and the distance between the tube installations. These conditions were taken into account, both for the protected and unprotected poles, in determining the required location of tubes.

Recognizing that little information is available on the duty required of arrestors located in stations, where considerable influence on incoming lightning waves may be produced by a large number of circuits connected to one bus, by the capacitance to grounded steel work in the station, by the more or less sheltered location of some stations, and by types of construction commonly used for transmission lines, I. W. Gross, of the American Gas and Electric Service Corp., and W. A. McMorris, of General Electric Company, presented data obtained in a cooperative field investigation in a paper entitled "Lightning Currents in Arresters at Stations."

Among the conclusions arrived at by the authors are the following:

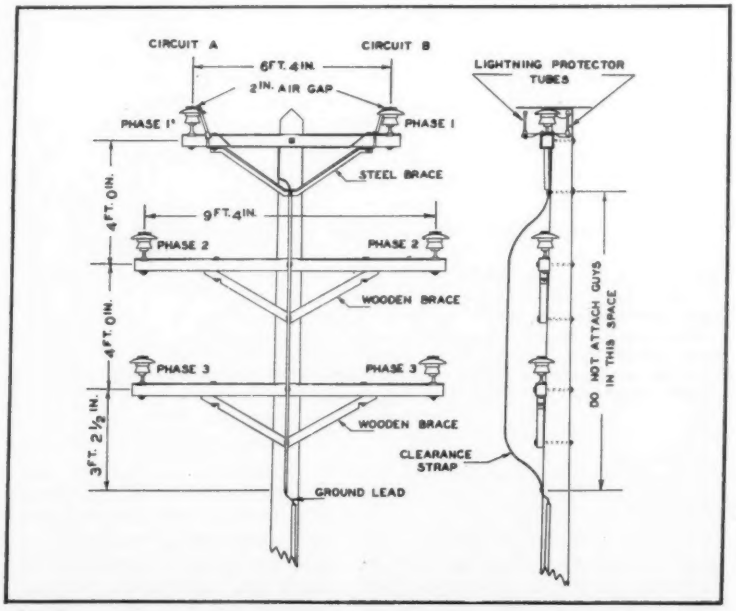
"The data obtained indicates that the number and magnitude of discharge currents through arresters in stations is strongly influenced by local conditions and seasonal variations, and representative values can be determined only by experience over a period of several years . . .

"The highest discharge current recorded through one pole of an arrester was 15,000 amperes. There is no reason for believing that this is the highest discharge current that can occur, and it is expected that as more data are accumulated, substantially higher currents will be recorded . . .

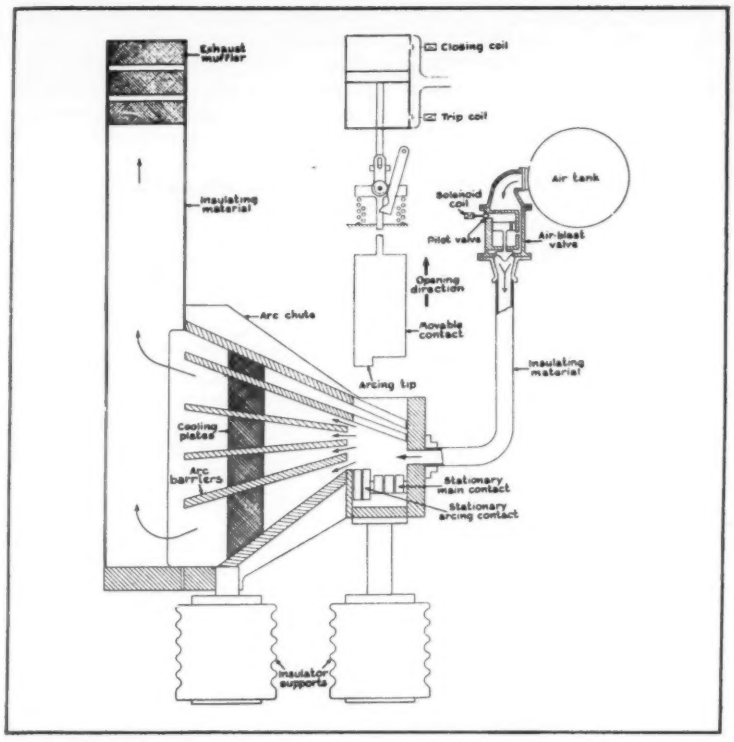
"Arresters connected to wood pole lines without ground wires were subjected to more high current discharges than other arresters. Discharges of 5000 amperes or more occurred about ten times as often as with other types of line construction . . .

"For arresters connected to wood pole lines without ground wires, more than one pole of the arrester was involved in about two-thirds of the cases when discharges were recorded. For arresters connected to other types of lines, more than one pole of the arrester was involved in only about one-third of the cases . . .

"The data indicates that increasing the number of lines connected to a station bus decreases the magnitude of the current



Arrangement of double circuit protected pole top showing location of protector tubes and other equipment, as described in paper presented by Messrs. Sels and Gothberg, of Public Service Elec. and Gas Co.



Schematic diagram of air-blast circuit breaker operating mechanism and control. (This was presented as Fig. 2 in the paper by Messrs. Strang and Boisseau, of General Electric Co.)

which any one lightning arrester in the station is required to discharge . . .

"The data indicates that when a lightning current enters a station on a line equipped with a lightning arrester at the station entrance, the lightning voltages reaching other parts of the station are not usually sufficient to cause the operation of other arresters . . ."

Circuit Breakers

The recently developed air blast type circuit breakers, available from several manufacturers, came in for a considerable discussion at the technical session on Circuit Breakers.

In a paper entitled "The Cross Air Blast Circuit Breaker," D. C. Prince, General Electric Company, J. A. Henley, Metropolitan Vickers Company, Ltd., and W. K. Rankin, General Electric Company, pointed out that the designs of European air blast circuit breakers are not wholly satisfactory for operation in the United States as they do not handle high enough currents, cannot economically be built for high enough interrupting capacities, and do not conform to United States installation arrangements. The authors then discussed a new type of air cross blast circuit breaker that has been developed which does conform to these requirements.

Their paper analyzed the theory of performance of the foreign and cross blast circuit breakers and presented evidence from a number of sources which throw light on the method of operation. Their study indicates that the circuit breaker operates predominately on the displacement theory and that the nature of its performance makes it much less sensitive to recovery rate and high currents and much more economical in air consumption than air blast breakers previously available.

The commercial design of the circuit breaker mentioned above was discussed in a companion paper entitled "Design and Construction of High Capacity Air Blast Circuit Breakers," presented by H. E. Strang and A. C. Boisseau, both of General Electric Company. The design and operating advantages claimed for the air blast breaker by the authors include the following:

1. Complete elimination of fire hazard.
2. Positive operation, with arcing time closely approaching the irreducible minimum.
3. Contacts and arcing compartment built for long life, and minimum deterioration.
4. Arcing contact exposed for ease of inspection.
5. Flexibility of mounting arrangement, permitting either bottom, back or top connections.
6. Space requirements equal to, or less than correspondingly rated oil breakers, which is of importance in modernization of old stations or extensions of existing switchhouses.
7. Simplicity and compactness of application to steel cubicle construction, which is easy to install, safely interlocked, and having all design features coordinated.
8. High inherent current-closing ability.

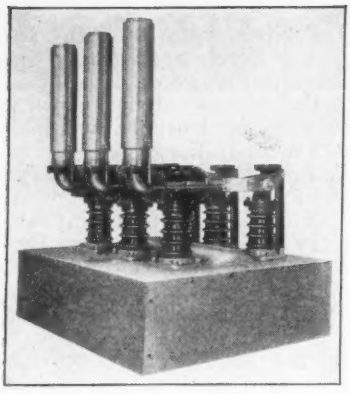
The authors pointed out that a number of high capacity units have been placed in service, and that a 1,500,000 kva, 15 kv triple pole unit has been built and completely tested.

"A New 15 kv Pneumatic Circuit Interrupter," was the subject of a paper presented at this session by L. R. Ludwig, H. L. Rawlins, and B. P. Baker, all of Westinghouse Electric and Manufacturing Company. The authors compared the various principles of air circuit interruption, including compressed air arc extinction, self-generated gas blast breakers, and magnetically produced air blast methods. They describe the compressed air interrupter in considerable detail and outlined the test results.

Compressed Air Most Effective

The authors concluded that the use of a compressed air stream transverse to an arc is the most effective type of dry circuit interrupter, and reported that currents as high as 65,300 amperes have been interrupted at 13,200 volts single phase with a contact operation of approximately 2 inches, which can be mechanically obtained in one-half cycle. A breaker utilizing these new principles of interruption, they said, makes possible new standards of system protection because of its high operating speed, complete freedom from oil and associated fire hazard, and remarkably high interrupting capacity in terms of the space required by the breaker.

A further detailed discussion of air blast circuit breakers was presented by W. E. Edsall and S. R.



Typical indoor type air-blast circuit breaker as described by Messrs. Edsall and Stubbs, of Allis Chalmers Mfg. Co., in their paper on "Circuit Interruption by Air Blast."

Stubbs, both of Allis-Chalmers Manufacturing Company, in a paper entitled "Circuit Interruption by Air Blast." Of particular interest in this paper was the discussion of factors affecting rate of rise of recovery voltage.

"It has long been known," said the authors, "that the rate of rise of recovery voltage can be beneficially influenced by inserting a resistor into the interrupting circuits. In the air blast breaker limitation of the rate of recovery voltage rise is accomplished by the use of resistors inserted into the circuit by means of the action of the arc itself . . .

"High frequency transients are practically eliminated and the voltage immediately following arc interruption follows generally the normal sinusoidal wave form."

Discussing air breakers in the lower voltage field, L. R. Ludwig and R. H. Nau, both of Westinghouse Electric and Manufacturing Company, in a paper entitled "Magnetic Deion Air Breaker for 2,500-5,000 Volts," discussed the theory of quenching an arc by deionizing the normally conducting arc stream, utilizing a gas blast produced by means of an intense transverse magnetic field. The paper described a new form of air circuit breaker for 2500-5000 volt service in which these design principles have been applied. Considered especially in the paper was the problem of adequately enclosing the breakers and it was pointed out that excellent interruption can be obtained in an enclosure of small overall dimensions.

The authors concluded that the high efficacy of the new Deion circuit breaker to function at and above 150,000 kva up to 5,000 volts, demonstrates the practicability of the interrupter utilizing a gas blast which is produced by an intense transverse magnetic field. This interrupter is particularly desirable because the noise and demonstration usually found in air circuit breaker practice is greatly reduced. Also, the ionized gases and other by-products of arc interruption are sufficiently controlled by the interrupter so that no unusual barrier arrangements are required.

Relays

In the session devoted to relays, a number of papers were presented on current transformers. "Overcurrent Performance of Bushing Type Current Transformers," was the title of a paper presented by C. A. Woods, Jr., and S. A. Bottonari, both of the Westinghouse Electric and Manufacturing Company. In this paper, the authors pointed out that while the ratio and phase angle characteristics of current transformers have been continuously improved, particularly with respect to the requirements for metering service, current transformer application from the standpoint of circuit protection has become more involved and increased attention has been given to it.

A better knowledge of transformer performance is necessitated by the requirements of new relays and protective schemes, they said. Attention to the influence of the direct current component in short-circuit transients is especially necessary when using high speed relays. Also, in differential connections, the necessity for equivalent matching of saturation characteristics is essential. These are illustrations of the types of problems which ratio and phase angle characteristics alone do not solve, and the analysis of open circuit saturation curves has proved of immense value in the solution of these problems.

In discussing the value of saturation and loss data in the field of relay application, the authors reported that it can be utilized to determine relay settings for various magnitudes of secondary burdens and primary currents, as well as ratio and phase angle characteristics. The data may also be used to determine the range of linear performance, which is valuable in any application, and is particularly useful in comparing characteristics of transformers for differential protection schemes. Where a knowledge of the exciting impedance is required for the determination of leakage currents in branch circuits, it may be easily obtained from the saturation and loss curves. This information, like that required for transient performance, cannot be readily obtained from the conventional performance curves.

The authors said that when the saturation and loss data is available on any ratio, it can be used to determine the performance on any other ratio using the same core. Likewise, it can be used for any burden within the capacity of the transformer; the latter being quite evident from such data when defined in terms of permissible error and current range. Since the versatility of the saturation and loss curves lends itself to the simplification of many diversified problems, they should appeal as a means of more clearly defining the over-current characteristics of bushing type current transformers.

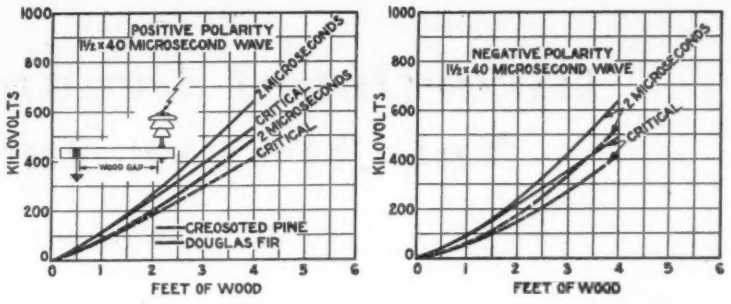
Test Methods Discussed

A proposed indirect method for the determination of current transformer errors was discussed in a paper presented by G. Camilli and R. L. TenBroeck, both of General Electric Company. The authors pointed out that current transformers for relay service must be able to function with reasonable accuracy under very high overload conditions and that it is therefore necessary that their accuracy for such high currents be verified. They explained that in performing the usual accuracy test at very high currents, certain difficulties are encountered, the principal ones being: (a) the difficulty of providing large amounts of power at large current values and bus bar type wiring required, (b) the necessity for standard burdens capable of withstanding heavy currents, and (c) the necessity for taking the meter readings very rapidly, within a few seconds, in order to avoid overheating of the current transformer windings.

In this paper, the authors proposed an indirect method for determining the accuracy characteristics—both phase angle and ratio—of a current transformer for both normal and abnormal currents, whereby the difficulties of test mentioned above are obviated, with no sacrifice of essential accuracy. The method consists in the de-

termination by test of impedance and of the excitation characteristics of the transformer, and then calculating from them the ratio and phase angle errors of the transformer. In this respect, they pointed out, the proposed method falls in identically the same category as the standard procedure for determining the voltage regulation of a power transformer indirectly from impedance measurements. The paper included several sample calculations and curves showing how closely the calculated results paralleled the data obtained by tests.

The subject of bushing current transformer performance was further discussed in a paper presented by J. P. Gabelein, of Consumers Power Company, and J. A. Elzi, of Commonwealth and Southern Corp. This paper presented a discussion of the more important results obtained in a series of extensive tests made on bushing current transformers. The tests were made to determine the division of current in interconnected secondary circuits for conditions simulating actual faults in the primary circuit, in addition to the determination of the ratio and phase angle characteristics. The authors presented evidence that most of the results obtained from the tests may be readily calculated from the excitation current data.



Impulse insulation added to pintype insulators by crossarms—typical of the detailed test data presented by Messrs. Lusignan, and Miller, of Ohio Brass Co., in their paper "What Wood May Add to Primary Insulation for Withstanding Lightning."

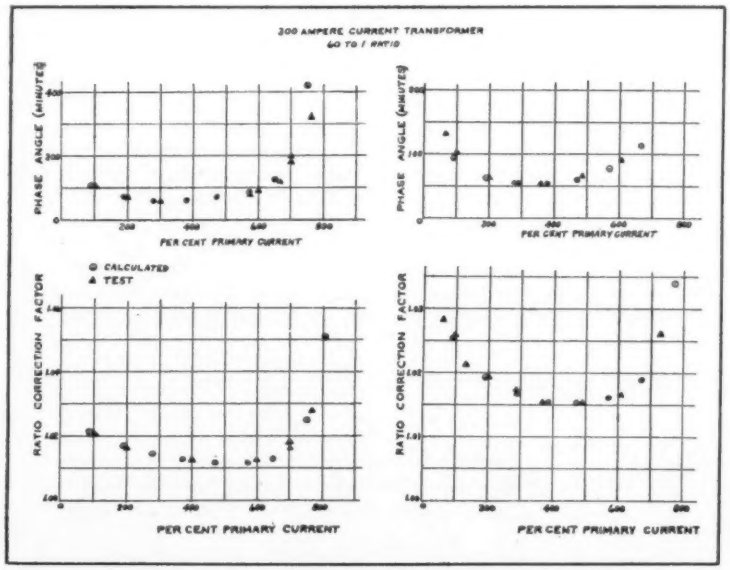
The authors' analysis of the tests results lead them to the following conclusions in regard to this general type of transformer:

"1. Bushing current transformers having cores of adequate volume and reasonably high turn ratios have characteristics which are very desirable from the standpoint of relay application and in some cases may be superior to instrument type transformers.

"2. The performance characteristics of bushing current transformers can be determined with reasonable accuracy from the in-phase and quadrature components of the excitation current.

"3. The distribution of current in circuits involving interconnected transformer secondaries can be arrived at by a consideration of the impedance of the burdens in the various branches of the secondary circuit and the excitation characteristics of the current transformers. For various primary circuit conditions a solution is obtainable by making calculations for each primary current separately assuming no current in the other primaries and then combining results.

"4. The effect of increasing the volume of the core of a bushing transformer by a certain per cent is equivalent to decreasing the burden by a like per cent. Likewise, the use of two bushing transformers in series is equivalent to reducing the burden on one to half the total burden."



These curves indicate the close relation between calculated and test results which support the indirect method for determining the accuracy characteristics of current transformers in terms of phase angle and ratio, as described by Messrs. Camilli and TenBroeck, both of General Electric Co. The curves at left were for a bushing type transformer with distributed secondary winding, burden 50 va, power factor 100%, 60 cycles. The curves at right are for a bushing type transformer with secondary concentrated on approximately ¼ of the circumference of the core, burden 50 va, power factor 100%, 60 cycles.

Power Transmission

In the technical session on Power Transmission, Joseph T. Lusigan, Jr., and Charles J. Miller, Jr., both of The Ohio Brass Company, discussed what wood may add to primary insulation for withstanding lightning. The paper presented the results of a testing program treating of all factors which it was felt could affect the lightning or impulse strength of wood. An analysis of the test results, led the authors to the following conclusions:

"1. Properly selected and controlled wood may add appreciably to the lightning insulation of a line. The magnitude is more or less in proportion to the wood length and may be estimated from curves presented in this paper.

"2. Almost without exception,

(*Continued on page* 35)

Directional Ground Relays Not Always Infallible

By J. W. Graff and C. C. Jones

Operating Department
Alabama Power Company

IN recent years, since the application of ground relaying to transmission networks has received comprehensive engineering study, the current polarized directional ground relay has been brought to the forefront. Other methods of obtaining directional discrimination, such as by interlocking the contacts of a non-directional ground relay through the contacts of a directional power relay of the inter-phase type, have met with limited, if any, success. This is especially true where load current can be considerably heavier than ground fault current.

Negative sequence power polarization, while attractive at first glance, is often unsatisfactory due to lack of sufficient negative sequence quantities during light ground faults and also due to the characteristics of high voltage bushing current transformers which do not reflect accurately all primary current and phase angle conditions.

The following discussion is not intended to detract from the reputation of current polarized ground relays as the most reliable form of directional ground relay, but rather to increase their effectiveness by pointing out various features in connection with their application which may require special study.

The positive directional characteristics of the current polarized ground relay give it many advantages and it has generally been considered as a relay which "couldn't go wrong." There are, however, certain conditions under which these relays may give an incorrect directional indication and, if there is sufficient current, an incorrect tripping operation.

One such condition may occur when the relay is polarized from the neutral of a Y-Y-delta transformer bank with both Y connections grounded and with a zero sequence generating source connected to the unfaulted Y winding or to both Y windings.

Ordinarily, these relays are polarized from a current transformer in the grounded neutral of a Y-delta or zig-zag connected grounding bank. Under this condition, the neutral current is in the same direction for all ground faults. This is shown in Fig. 1 where only zero sequence current is present in the transformer and the direction of flow in the delta winding must be such as to balance the currents appearing in the Y windings. The direction of current in the Y winding on the faulted phase is established by the fault location and the direction in the other phases is fixed by definition of zero sequence currents.

The three-winding bank differs from the simple two-winding type in that it not only provides a source of zero sequence current from its own delta winding, but also transforms the input from the system connected to one Y winding and transmits it to the faulted system connected to the other Y winding.

Fig. 2 shows a typical fault current distribution for a three-winding bank having zero sequence generating sources connected to each winding. For simplicity one to one winding ratios are assumed. From this diagram it may be seen that the fault current I_F comes partly from Generator 2 and partly from the bank. The current from the bank is again from two sources, that transformed and transmitted from the primary and that supplied through the delta from the sound phases. If the fault were on the primary side, the current in both primary and secondary neutrals would reverse. The current I_N in the common neutral might or might not reverse, depending on whether the system input to the unfaulted Y winding, together with a primary to secondary voltage ratio greater than one, is sufficient to balance out the component supplied by the delta.

The current I_N appearing in the common neutral is the vector sum of I_P, the primary neutral current, and I_S, the secondary neutral current, as is shown in Fig. 2. For a ground fault on one Y system the zero sequence input from the unfaulted Y system will enter its transformer winding and return to its source via the neutral and

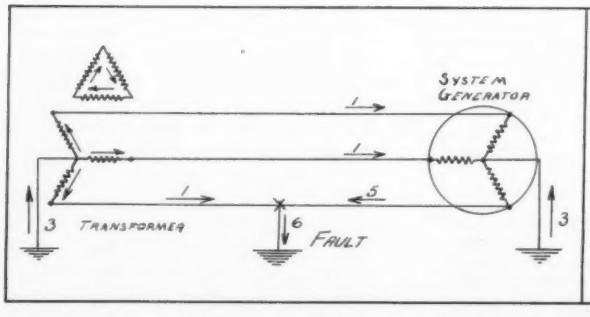


Fig. 1. Typical current distribution in a Y-Delta transformer and grounded system for a ground fault.

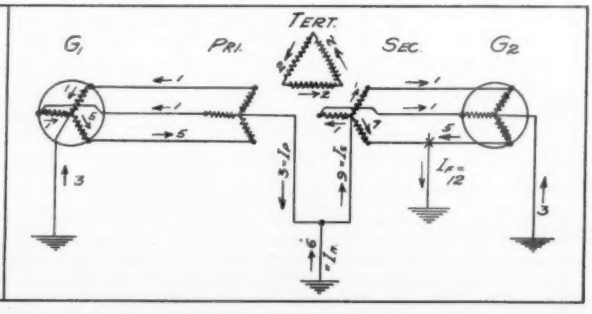


Fig. 2. Typical distribution of ground current in a three-winding transformer bank. (One-to-one ratio.)

ground. The current in the Y winding connected to the faulted system, then, consists of the inverted input to the other Y winding plus the inverted current from the delta winding. Both components of current, of course, are modified by the current transformation ratio to the faulted winding. The net current in the common neutral may thus be in either direction depending upon the magnitude and direction of its components.

As the sum of ail currents entering and leaving a common point must equal zero, assuming positive to be toward the junction for all branches, the following equation may be written:

$I_N+I_P+I_S=0$, where (1)

I_N=Current in common ground of both primary and secondary windings.

I_P=Current in primary neutral.

I_S=Current in secondary neutral.

For a primary or high voltage fault, as shown in Fig. 3, I_P will be opposite in direction to I_S and we may write:

$I_N+(-I_P)+I_S=0$, or

$I_N=I_P-I_S$ (2)

I_P consists of two components: (a) that necessary to balance flux due to current in the secondary and (b) that necessary to balance flux due to current in the delta winding. The first component (a) is equal to the secondary current divided by the transformation ratio R from primary to secondary windings, or I_S/R. The second component (b) is the remainder which is I_P-I_S/R and is supplied through the delta winding from the sound phases.

While the transformer bank transmits current of all three phase sequences, only the zero sequence component appears in the neutrals. For a fault on the primary side the ratio of components of primary current, I_S/R and I_P-I_S/R is fixed by the inverse ratio of the zero sequence impedances of the two sources of zero sequence current. Fig. 4 is an equivalent zero sequence impedance diagram for this condition, where:

G_1, G_2 and G_A=Zero impedance generators.

Z_P, Z_S and Z_A=Equivalent Y impedances for a three-winding bank.

Z_H=Z_P plus primary system zero sequence impedance to transformer terminals.

Z_L=Z_S plus secondary system zero sequence impedance to transformer terminals.

R= Transformation ratio from primary to secondary.

Thus we may write:

$$\frac{I_S/R}{I_P-I_S/R}=\frac{Z_\Delta}{Z_L} \qquad (3)$$

$$Z_\Delta\left(I_P-I_S/R\right)=\frac{Z_L I_S}{R}$$

$$Z_\Delta I_P=\frac{Z_L I_S}{R}+\frac{Z_\Delta I_S}{R}$$

$$I_P=\frac{Z_L I_S}{Z_\Delta R}+\frac{I_S}{R}$$

$$I_P=\frac{I_S}{R}\left(\frac{Z_L}{Z_\Delta}+1\right) \qquad (4)$$

Substituting in (2) the value of I_P from (4) we have:

$$I_N=\frac{I_S}{R}\left(\frac{Z_L}{Z_\Delta}+1\right)-I_S$$

$$I_N=\left(\frac{Z_L}{Z_\Delta R}+\frac{1}{R}\right)I_S-I_S$$

$$I_N=\left(\frac{Z_L R+Z_\Delta R}{Z_\Delta R^2}\right)I_S-I_S$$

$$I_N=\left(\frac{Z_L+Z_\Delta}{Z_\Delta R}\right)I_S-I_S, \text{ OR}$$

$$=\frac{1}{R}\left(\frac{Z_L+Z_\Delta}{Z_\Delta}\right)I_S-I_S \qquad (5)$$

From equation (5) it is seen that the direction of I_N is determined by the magnitude of the term $(Z_L+Z_A)/Z_AR$. If this term is less than unity then I_N is negative or from neutral to earth. If the term is greater than unity then I_N flows from earth to neutral, the usually assumed direction and that necessary for directional ground relay polarization. Fig. 5 shows the relations between Z_L, Z_A and R for $I_N=0$.

If the fault were on the secondary or low side of the transformer bank the same relations as above would hold, substituting of course, the primary system plus bank zero sequence impedance for the secondary value, I_P for I_S, and R for 1/R. This results in the equation:

$$I_N=R\left(\frac{Z_H+Z_\Delta}{Z_\Delta}\right)I_P-I_P \qquad (6)$$

An examination of (6) will show that I_N can never be negative for a secondary or low side fault.

There are several possible ways of preventing incorrect relay operations in cases where the neutral current reverses. Of these the following are the most practical:

1. Polarize the ground relay from a current transformer in the delta winding where the current is always in the same direction during ground faults.

2. Use three potential transformers connected Y-Y, and an auxiliary Y-delta transformer in connection with a potential polarized ground relay.

3. Balance out the transmitted component of neutral current by using current transformers of the proper ratio in both primary and secondary neutrals, with the current transformer sccondaries connected in parallel.

The first of these methods is practical if the delta voltage is low and this winding carries no load.

The potential polarized ground relay can be used if the additional expense of the necessary potential transformers can be justified.

If neither of the first two methods of polarization are applicable, the third can be used and, in most cases, will be the most satisfactory and reliable. In this case, the current transformer for the primary neutral (assuming a primary fault) is selected to give the desired value of secondary current based on the zero sequence contribution of the delta winding. The current transformer in the sec-

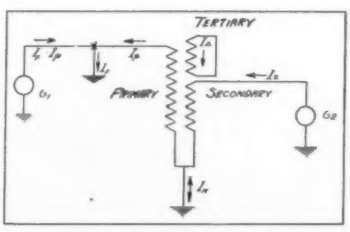


Fig. 3. Equivalent single phase circuit showing essential transformations and zero sequence current directions for primary or high side fault.

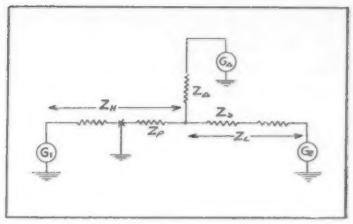


Fig. 4. Zero sequence network for Y-Y-Delta transformer bank connected to grounded systems on high and low side with fault on primary.

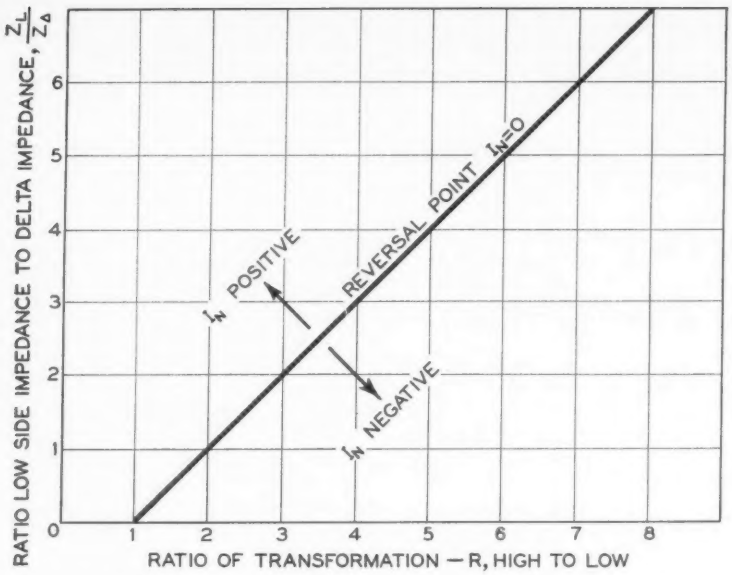


Fig. 5. Value of system constants at which reversal of neutral current takes place.

ondary neutral must have a ratio of R times that of the primary neutral current transformer.

Fig. 6 illustrates this connection. It will be seen that the net current to the relay is $I_P - I_S/R$, or the component of the fault current suplied by the delta winding. The component of I_P due to I_S is balanced out of the current transformer secondary circuit at all times, leaving only the component due to the delta winding, which is constant in direction for all ground faults. This scheme has been successfully used in a number of installations where trouble was encountered due to the reversal of neutral current I_N from low impedance of system connected to the low voltage Y winding, high impedance delta winding, or high transformation ratio. It will be noted from (5) and (6) that the reversal of I_N occurs only for high side faults and is most common with high transformation ratios.

Another condition affecting the directional discrimination of current polarized ground relays, which is less subject to solution when encountered, is that due to electro-magnetic induction between parallel grounded circuits.

Where a transmission line or part of a transmission network is terminated by low impedance grounded banks, it constitutes a huge loop which is capable of picking up induced current due to fault current flowing in adjacent circuits as shown in Fig. 7.

As will be noted from the directions shown, the relays at both ends of the unfaulted line will get an indication to trip. However, for the magnitude of the induced current to approach tripping value, the separation between circuits must be relatively small and the length of parallel section comparatively great. In one case, trouble of this nature was experienced on a parallel of 30 miles between two 44 kv lines having a separation of about 8 feet.

The methods of calculating these currents are well known and will not be discussed here but where such parallels occur their effect should be determined by calculation or primary test. If these currents are found to be above tripping values some steps must be taken to (1) open the loop in which the induced current flows (2) balance out the induced current by means of current transformers of proper ratio so located that they carry the fault current, or (3) set relays above

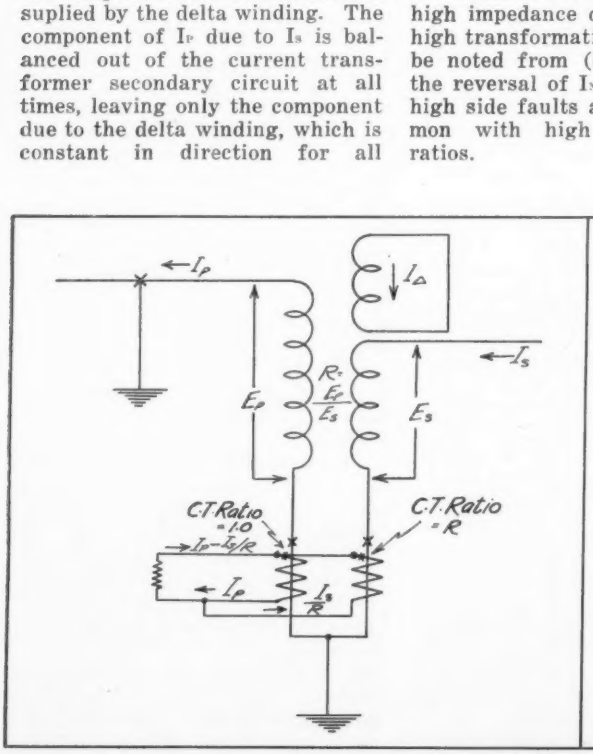


Fig. 6. Current transformer connections for balancing out transmitted component of neutral current leaving only the delta component for relay polarization.

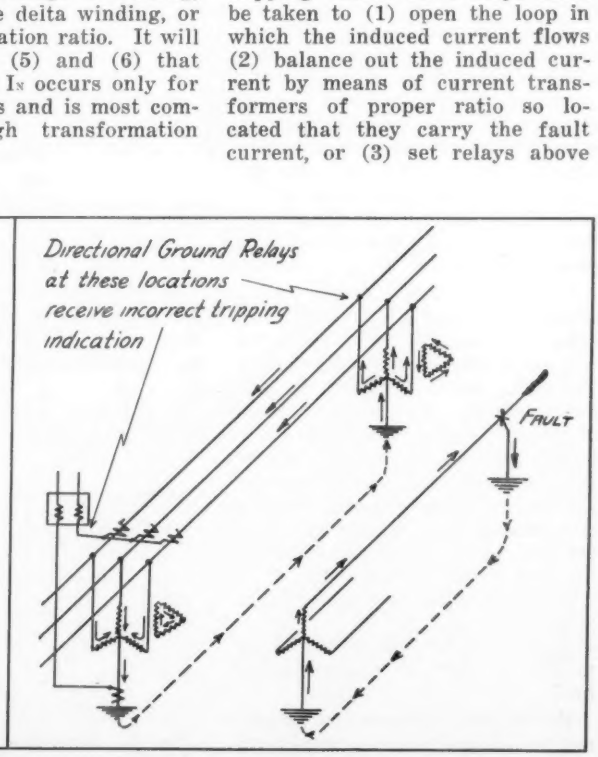


Fig. 7. Paths taken by fault current and induced current in physically parallel lines.

the value of current induced by fault current in a parallel line.

Summarizing this article, we may say that directional ground relays can operate incorrectly if polarized from the common neutral of a three-winding bank or when connected to an unfaulted circuit which is parallel to a faulted one.

Trouble from the first cause will occur during high side faults if the term $(Z_L+Z_A)/Z_AR$ approaches unity. It may be overcome by using (1) a current transformer in the delta winding (2) potential polarization or (3) a current transformer in each neutral, with coordinated ratios.

Trouble of the second kind occurs when the coupling between circuits is close. It may be overcome by ungrounding the Y-delta bank at one end of the loop. If this is impractical, potential polarization is indicated.

With reasonably accurate calculations of ground fault conditions and precautions taken against the above difficulties, current polarization of ground relays, properly co-ordinated, will give correct operation under all fault conditions.

Improved Equipment Discussed by Engineers

(*Continued from page* 28)

the lower the moisture content of wood the higher will be its supplementary lightning insulation value; in particular, reducing the moisture content from an average green-wood value of about 35 per cent to an average moisture equilibrium value of about 15 per cent may nearly double the insulation strength of creosoted pine structures, and raise that of fir structures by about one fourth.

'3. During a rain storm, the lightning insulation strength of structures utilizing wood as supplementary insulation may suffer reductions to as low as 65 per cent of the dry flash-over voltage within two or three minutes after the start of rainfall; further reduction, with continuation of the rain, is inappreciable.

"4. The supplementary lightning insulation strength of wood is not appreciably altered by the grade of creosote, degree of retention, or creosoting process used in its treatment."

Adding considerably to the limited data available on the impulse strength of cable insulation were two papers presented at the power transmission session. One of these, entitled "Impulse Strength of Cable Insulation," was presented by E. W. Davis and W. N. Eddy, both of Simplex Wire and Cable Company. This was followed by a paper entitled "Some Impulse Voltage Breakdown Tests on Oil-Treated Paper-Insulated Cables," presented by C. M. Foust and J. A. Scott, both of General Electric Company. The data presented in these papers should facilitate analysis of cables damaged by lightning and the minimizing of lightning trouble by proper cable design.

Instruments

A discussion of the accuracy of watt-hour meters on intermittent loads indicated that the registration characteristic of a meter on most types of intermittent load can be predicted from the acceleration and deceleration curves for the meter disk. The authors of this paper, M. A. Faucett, C. A. Keener, and M. S. Helm, all of the University of Illinois, pointed out that the magnitude of the error is a function of the meter design, the periodicity of the intermittent component of load, the ratio of intermittent component to total load, the character of intermittent component, power factor of load, and adjustment of the friction compensation. The investigation indicated that the increased ratio of driving torque to the moment of inertia of the moving element have decreased the accelerating time for a given load change in modern meters and that this improvement has decreased the meter error on intermittent load from the values found in the older designs of meters.

Under the title "A Precision Rotating Standard for the Measurement of Kilowatt Hours," J. H. Goss and A. Hansen, Jr., both of General Electric Company, described an improved system for maintaining the value of the kilowatt hour to be used primarily for the calibrating and checking of portable standard watthour meters.

The adoption of basic impulse insulation levels by committee action in 1937 has actively stimulated the work of designing and redesigning equipmtnt to reach these levels, reported Philip Sporn of the American Gas and Electric Service Corp., and C. A. Powel, Westinghouse Electric and Manufacturing Company, in a paper on "Basic Impulse Insulation Levels." The authors presented a new proposed basic impulse insulation level which would require equipment to withstand the specified test rather than permitting flash-over at the specified value. The proposed new basic levels, they said, appeared to be based on sound fundamentals of the insulation coordination problem, and their early acceptance should result in a distinct forward step in carrying on the work to a conclusion.

In another paper presented at this same session, a third discussion in the series on rationalization of system insulation, was presented by Philip Sporn and I. W. Gross, also of Amercian Gas and Electric Service Corp.

Discussing the margins between basic insulation levels and protectable levels, the authors said, "Eventually it will be found necessary and desirable, in order to complete the solution of the problem of rationalization of system insulation, to provide definite margins in the levels of different equipment forming part of any given transmission system. It may be that this can best be done as part of the natural development which started with the work of investigation and determination of impulse characteristics of equipment, continued with the investigation of natural and system overvoltage phenomena, to be followed by the establishment of proper B.I.L.'s and by the development of equipment to protect these levels and, finally, completed by the assignment of insulation strength to various equipment groups in terms of these levels.

Insulation Coordination

"Whether such margins in levels for different equipment on one system should be established at the time the problem of assignment of insulation strength to various equipment groups in terms of B.I.L.'s is carried through, or whether it will be best to await the experience gained by the assignment of practically coordinated levels for all the items of various equipment in a voltage class, is something that need not be determined at the present. The problem, in any case, is well enough in hand to permit patience with a view of not only allowing for integrating further experience, but also of making certain that no heavy burden is thrown on any portion of the industry concerned in this problem."

NEWS of the INDUSTRY

Dealers

REA Farm Equipment Exhibit Touring South

The Rural Electrification Administration's Electric Farm Equipment Tour started on its new itinerary through the southern states on January 22. First stops will be made in Texas, and the tour will come to an end in Maryland next April.

The tour made its first stop at Gilmer, Texas, which will be followed by demonstrations at Henderson, Johnson City, LaGrange, Itasca, Mart, and El Campo, Texas. It will then enter Louisiana, where two definite stops have been scheduled at Lafayette and Franklinton. Several others are planned. The tour will then proceed through Alabama, Georgia, South Carolina, North Carolina, Virginia, and Maryland, making 26 stops in all.

Decision to route the tour through these states is the result of the highly successful summer and fall trip through the north central and south central states during which 156,850 persons attended the demonstrations at 42 stops. This section of the tour was completed in Texas in December.

Reports of sensational dealer sales activities in connection with the tour are being received in Washington daily. The demonstrations averaged 26 dealer exhibits at each stop, with the highest number at McComb, Illinois, where 43 dealers participated. One manufacturer is reported by REA to have averaged 1 to 5 new dealer appointments at each stop.

The recent tour carried from 8 to 20 manufacturers' exhibits, the number varying over the five months the show was on the road. Trailers, one of them equipped at a cost of $20,000, were used by manufacturers to show their equipment. These exhibits will accompany the southern states tour. Every type of home and farm electric equipment is included in the demonstrations.

Many incidents are related of the enthusiasm with which home and farm appliances were received. The experience is told of one dealer who loaded a walk-in refrigerator on a truck and drove up to the "midway" with the intention of setting up his exhibit. He sold his refrigerator before he could get the tailgate down.

REA officials in charge of the tour urge southern dealers who are planning to exhibit during the coming demonstrations not to overlook seasonal appliances. For instance, the tour will start during the hatchery season, and such equipment as brooders, water heaters, and chick feed grinders will be timely. Electric hay choppers will also be a seasonal item. All types of electrical dairy equipment will be in demand.

REA advance men arrange publicity for the show, and local newspapers in electric cooperative communities have been devoting their entire front pages to the show. In many cases, special editions have been issued.

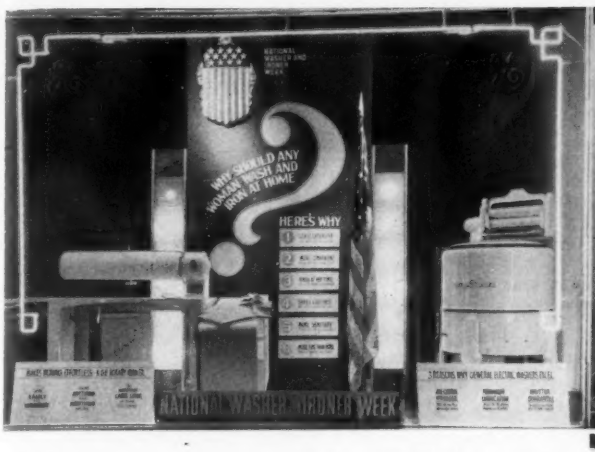
REA works up a prospect list for each dealer through a registration system obtained through the incentive of door prizes for cooperative members. On the registration card the tour visitor lists the appliances he now has and those he plans to have. This list, together with a membership list of the cooperative is given to each dealer. Registrations of from 5,000 to 8,000 were secured at each two-day stop during the central states tour.

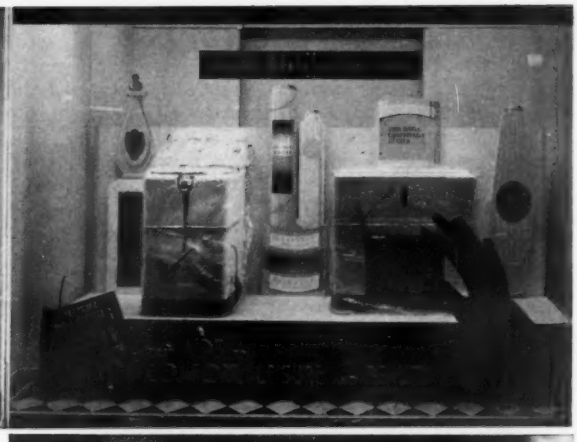
Farm equipment demonstrations space is provided along the midway at each stop. This space can be extended. The home appliance exhibit space inside the demonstration tent, however, will accommodate about 28 dealers. Inquiries concerning the tour should be addressed to REA at Washington. They will be forwarded to officials in charge of the tour.

Range "Revue" Plans Revealed by Bureau

For the first time, the Modern Kitchen Bureaus advertising for the electric range will follow a continuous, year-round schedule—give utilities and dealers a big

Here's a preview of some of the Modern Kitchen Bureau's eye-catching advertisements for electric ranges which will appear in the Saturday Evening Post, Better Homes and Gardens, and McCall's magazines throughout 1940. For the first time, the Bureau's advertising for the electric range will follow a continuous, year-round schedule.





These were the winners in the National Washer-Ironer Week's window display contest, sponsored by the American Washer and Ironer Manufacturers' Association last fall. At left above, the winner of the first prize of $200 entered by the Main Appliance Company, Dayton, Ohio. Winner of the second prize, amounting to $100, is shown at right below. It was entered by Buffalo Niagara Corporation, Buffalo, N. Y. Upper right is third prize winner of $50 entered by the Ohio Edison Company, Youngstown, Ohio. Dozens of other dealer and utility company displays won other prizes in this national contest, in which entries were received from practically every one of the forty-eight states.

year-round build-up for local Electric Range "Revues which closely tie-in with the campaign.

The advertisements set the theme for the 1940 electric range shows by telling women that Grandma's thrilling discovery of electric *light* in 1890 will be their same thrill today when they discover electric *cooking*. They invite prospects to see their dealers 1940 Electric Range Revue.

The central theme of the advertisements is that electric cooking is: *"Fast* as fire—without the flame! *Clean* and *cheap*—like electric light!" Tie-in advertising and promotional material for dealers and utilities is complete and gives full stage directions for putting on customer-attracting Reviews.

The first striking sales-aid is a knockout of a window banner, reproduced in full-color Kodachrome photography. It ties in directly with the national advertisements, repeats the theme, echoes the motif and invites prospects to come in and see the Review.

A series of six colorful, catchy display sheets comes next. Two direct mail folders, a letterhead sticker, a plate reprint of a two-color national advertisement, a Jumbo of a full-page, two-color advertisement in *Satevepost*, a series of six newspaper advertisements printed in two sizes, and a series of 20-word, 50-word and 100-word radio spot announcements give users of the material a perfect steamroller of a sales machine.

A complete plan book that describes in detail the entire operation, including full instructions on how to put on a ringer-dinger of an electric range review, will go out to utilities and dealers immediately.

Knoxville Dealers Report New Sales Records

Electric appliance dealers in Knoxville are reporting record-breaking sales. Their reports show that they sold a total of $2,093,727 in appliances during 1939, compared to $1,479,712 for the previous year, or an increase of 41.5 per cent.

They sold 3,198 electric refrigerators, an increase of 40 per cent; 1,814 ranges, an increase of 40 per cent; 397 stokers, an increase of 397 per cent; 633 electric water heaters, an increase of 118 per cent; 8,021 radios, up 47 per cent; 3,165 washing machines, up 17%.

The largest increase in electrical appliances came in the commercial field, which indicates that it is still a big market. Commercial installations of electric refrigeration and air conditioning equipment totaled $172,772, compared to $19,643 for the previous year or an increase of 780 per cent.

The announcement of record-breaking appliance sales was a climax to a three-months campaign by dealers.

Contractors

New Orleans Contractors Fined in District Court

The New Orleans chapter of the National Electrical Contractors Association was fined $3,500 and 24 leading electrical contractors and contracting firms of New Orleans were fined $100 each in the United States district court at New Orleans, January 12, when they entered pleas of "nolo contendre" to charges of violation of the Sherman anti-trust law.

By filing the nolo contendre answer to the federal charges the Association chapter and firms and individuals neither admitted nor denied the charges made in indictments returned in the New Orleans court December 11. These charges asserted that the accused persons "dominated the commercial electrical business in New Orleans" and "entered into a conspiracy to restrain trade in electrical materials in interstate commerce in New Orleans in violation of Section 1 of the Sherman anti-trust act."

In pleading nolo contendre, which means literally "I do not wish to contend" or plead, the contractors neither admitted nor denied the charge and could neither be said to be guilty or innocent, court attaches pointed out, and that in submitting their case in that manner, however, they were subject either to dismissal by the court or a fine.

The case against the 26 firms, individuals and association, was an outgrowth of the nationwide inquiry by federal agents into alleged building practices which it is charged, are holding up construction in some cities.

At the same time the indictment was returned against the electrical men and firms, the Sheet Metal Association of Louisiana and was indicted for alleged violation of the Sherman act.

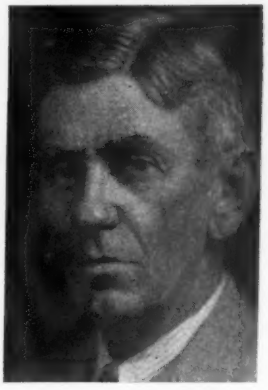
The indictment alleged the electrical contractors padded bids and divided proceeds of a contract payment in violation of Section 1 of the Sherman anti-trust law. The indictment charges the firms and individuals entered into an agreement between themselves for what is generally termed "joint ventures" in performing contracts in the commercial electrical field. It was asserted they exchanged quantity and cost figures on which they agreed to add a fixed percentage of profit and overhead before bidding on a job.

The indictment charged 3 per cent was added for the Engineering Survey and Audit Company, Inc., and that 10 per cent was added for the contractor receiving the work, in addition to his split in the additional percentages. The government charged that in some instances these additional percentages ran as high as 100 per cent.

Well-Known Texas Contractor Dies in Automobile Accident

An automobile accident on December 17 ended the career of W. M. Graham, president of Graham & Collins Electric Company, San Antonio, Texas, and one of the best known electrical contracting and appliance firms in the Southwest.

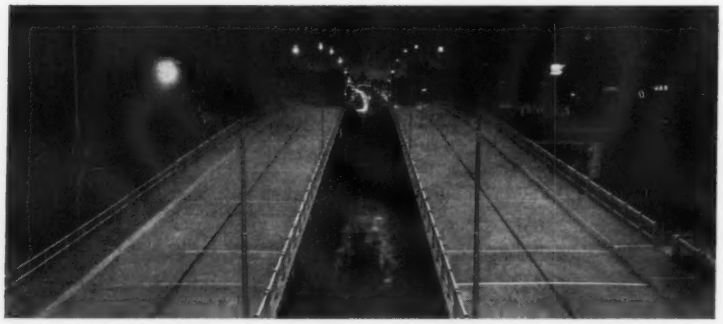
Mr. Graham was 65 years old and had long been active in the National Electrical Contractors Association, as well as in electrical activities in his home city and state.



W. M. Graham

The Graham & Collins company was established in 1907. As the firm grew, larger quarters were procured and the firm's last expansion took it to its present large home at 801 Main Avenue. E. J. Collins, joint founder with Mr. Graham, passed away several years ago.

Fred R. Loth, next in authority to Mr. Graham, said the firm will carry on the same as heretofore, with the same stockholders, and will continue its activity in the electrical contracting and merchandising field.



Adding to the rapidly growing number of sodium vapor lamp installations in the South is this new Market Street overpass, located one block from the business district in Shreveport, La., which was opened to the public in January. Twenty-two General Electric sodium vapor luminaires were installed with light centers mounted 30 feet above the roadway. Looking over the job are Jack Moorman, electrical contractor who handled the installation, Frank G. Camus, city electrician, and Roland Richards, superintendent, Southwestern Gas and Electric Co.

New Material Offered by Adequate Wiring Bureau

A more dramatic consumer appeal will be injected into the National Adequate Wiring Program for 1940 which should develop more business for every branch of the industry.

Basic to this new emphasis on service to the hundreds of local groups now promoting residential wiring is a "visualizer" being prepared for the special use of industry representatives carrying the wiring story to the general public and architects and builders. Pictorial in treatment, this compact visualizer will permit of its effective use before electrical industry groups in addition to builders, architects and the public.

Other promotional materials are being prepared to amplify the new sales approach, including an attractive window display.

Utilities

Alabama Power to Spend $6,000,000

The Alabama Power Company, through Thomas W. Martin, president, announced recently that it had set aside $6,165,000 for construction during 1940.

In a formal statement, Martin said: "Officials of Alabama Power Company today announced its construction budget of $6,165,000 for 1940, which will be the largest since pre-depression days. An outstanding difference between the 1940 construction program and those of recent years is that once again it seems possible, in view of national and state legislative policies, to plan for the future instead of confining construction work to immediate requirements.

"Of the total 1940 construction budget, over $1,000,000 will be for the extension of electric service in rural areas of the state. This will bring total rural mileage built by Alabama Power Company to over 7,900 miles, serving 43,000 rural customers.

"Nearly $2,000,000 will be expended for the further improvement of the electric power supply for Mobile and in the construction of the new Mobile steam plant, which is scheduled for completion in 1941.

"Additional lines, equipment and service improvements costing over $3,000,000 will be added to our electrical transmission and distribution system all over the state. The Montgomery district will see service improvements, substations and extensions aggregating $347,000. In the Tuscaloosa district, $160,000 will be similarly expended . . ."

Air Conditioning Utility Planned for Galveston

Air conditioning of business buildings through a central distributing plant will be tried out in Galveston, Texas, with installation of equipment to start immediately. The board of city commissioners has granted a 50-year franchise to P. E. Nichols, Jr., to install and operate a cold water distributing system for air conditioning of buildings in an area six blocks long and five wide in the business section of the city. Surveys have been under way for more than a year to determine essential equipment required, costs, loads and other data.

The distribution system will be operated from a central plant where a vacuum jet cooler will be set up. Water will leave the plant at a temperature of 60 degrees under a pressure of 10 pounds.

The consumer units will be equipped with cold water coils, air blowers, air filters and thermostatic temperature controls. Service will be metered and the customer will pay only for the amount of air conditioning used.

So far as is known, this is the first attempt to offer air conditioning service as a public utility.

Four New Cooperatives to be Organized in South Carolina

The Rural Electrification Administration has allotted $100,000 each to four South Carolina cooperatives, each of which is being organized with the cooperation and leadership of the State Extension Service. These loans were approved as a result of conferences in Columbia in which members of the REA staff met with state officials, including Governor Burnet R. Maybank.

While organization of the new cooperatives is not yet complete, results so far indicate that each will have about 125 miles of line and 400 members initially. Probable headquarters of the four cooperatives will be Monks Corner, Darlington, Bennetsville, and Kingstree.

The annual conference of the Southeastern Electric Exchange will be held in the Roanoke Hotel, Roanoke, Virginia, May 9, 10 and 11th, according to announcement by John W. Talley, executive secretary.

Successful Lamp Campaign Concluded in Memphis

Memphis Light, Gas and Water Division officials are very much gratified at the results of a Lamp Bulb Campaign just completed in which the employees of the organization participated. They feel that perhaps their campaign by employees has set a record for similar campaigns by utility employees with respect to the number of purchasers in relation to the number of customers and the average number of lamps per residential meter.

Results of their campaign are

Despite intensive competition from bottled and artificial gas, Florida Power and Light Company is successfully selling the superiority of electric cooking. F. B. Freeman, residential representative in Bradenton, Fla., for Florida Power and Light, stands here with twelve electric ranges which he has just sold to the Robert Whitney Hotel. According to F. D. Mallory, division sales manager, C. W. Sheldon, the company's commercial representative, assisted Mr. Freeman in closing the sale.

Every house needs
Westinghouse

PACEMAKERS.. FASTER FOR '40!

Complete New
WESTINGHOUSE RANGE LINE
with the
STAND-OUT FEATURE OF THE YEAR!

NEW

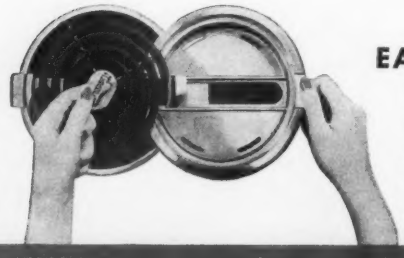
SPECTACULAR NEW MODELS DESIGNED TO SELL *FASTER IN '40!*

Every one of the 8 beautiful new models in the 1940 Westinghouse Range line is "tops" in its price class —every one is a big bargain value in modern cooking convenience. And advanced styling plus sensational new features open the way to a quick-profit selling pace that's "Faster for '40!"

See your Westinghouse Distributor or write Dept. 87, Westinghouse Electric & Mfg. Co., Mansfield, O. *today* for full details.

5-SPEED
COROX
HEATS 30% FASTER
USES 22% LESS CURRENT THAN EVER BEFORE!

5 SPEEDS on every Corox on every model in the 1940 Westinghouse line!



EASIER TO CLEAN!

Exclusive new, one-piece pan easily and completely removable for quick, thorough cleaning.

Westinghouse PACEMAKER Ranges

"The Line of Least Resistance"

Every house needs
Westinghouse
MRS. JONES, RIGHT NOW YOU'VE GOT ALMOST WHAT IT TAKES FOR REAL 140° HOT WATER SERVICE! THIS COMPLETES THE PICTURE!
SPECIAL LOW RATE
PLUMBING AND FIXTURES
(10% of House Value)
RUNNING WATER

IT'S TRUE! AND IT'S A BRAND-NEW SELLING IDEA TO BOOST YOUR WESTINGHOUSE ELECTRIC WATER HEATER SALES THIS YEAR!

Every electric water heater prospect has ALMOST what it takes for real 140° hot water service. They have about 10% of the cost of their homes invested in plumbing and fixtures. They have running water. They have a *special low rate* that makes electric water heating cost less than ever! But how many of them realize it? How many realize that for *just a little bit more* (and it might even be *less* when you consider the savings) they can enjoy perfect 140° hot water service all year 'round?

Herein lies the kernel of a real selling idea. Full details on this timely, effective selling plan are yours for the asking. Don't delay! Ask your distributor or, write to Westinghouse Electric & Manufacturing Company, Mansfield, Ohio, Dept. 86.

YOU'VE GOT almost WHAT IT TAKES
A NEW SELLING PLAN TO HELP YOU
Win Extra Profits
WITH WESTINGHOUSE Electric WATER HEATERS

Get your free copy of this "Hot" New Selling Plan!

Westinghouse *Home-proved* **Water Heaters**

"The Line of Least Resistance"

summed up as follows:

No. of lamp bulbs sold...	78,694
No. of lamp purchasers...	10,607
No. of residential customers	51,542
Percentage of customers who bought lamps	20.5
Average number of lamps per residential meter..	1.5
Average wattage per lamp	75
Total wattage of lamps sold	5,900,143

Memphis Light, Gas and Water Division acquired the physical properties of Memphis Power and Light Company during the past summer, and now operate the combined electric, gas and water services in Memphis. Electricity is supplied by the Division at T.V.A. base rates plus a small surcharge.

The sale of lamps by employees was the "opening gun" in a Better Light-Better Sight program beginning in October and continuing through March 1940.

The lamp selling campaign by employees was set-up and conducted after the pattern of similar campaigns by utilities in many cities.

A prospectus for the employees was prepared, giving details of the team quotas, etc. The prospectus was entitled, "War on Empty Sockets" in keeping with the present martial era. Under the caption, "A Call To Arms for All Employees," there was this dramatic urge:

"Take up arms for Better Light-Better Sight . . . You are rendering an important and healthful service to humanity when you sell adequate lighting for the home. Fill every empty socket with proper size lamp bulb. Triumph over the forces of darkness—poor light, eyestrain, and the countless ills caused by improper or inadequate lighting."

As an incentive to employees to go out and sell, a bonus of 50c per 1,000 watts was offered on lamp bulbs of 60 watts or larger size to customers during the period of the campaign. No bonus was allowed on bulbs under 60 watt size or on case lots or sales to commercial or industrial trade. The campaign was strictly a residential campaign.

New Manager Appointed For Nashville Utility

James E. Carnes, for many years an official of the Tennessee Electric Power Company until the sale of that company to the Tennessee Valley Authority and municipalities, has just been appointed general manager of the Nashville Electric Service serving 53,000 customers in the Tennessee capitol city. Mr. Carnes' appointment followed the death of John P. W. Brown, who had served in that capacity since the Tepco sale.

Mr. Carnes, succeeding Mr. Brown as general manager of the new Nashville Electric Service, has been assistant to Mr. Brown since

1919, as assistant general superintendent of the Nashville Railway and Light Company. He began work in the light company at Nashville in 1904, and few men have served in more departments than he. At the time Tepco was sold, he was assistant to the vice-president and general manager at Nashville, and his wide experience was recognized by his unanimous appointment to succeed Mr. Brown.

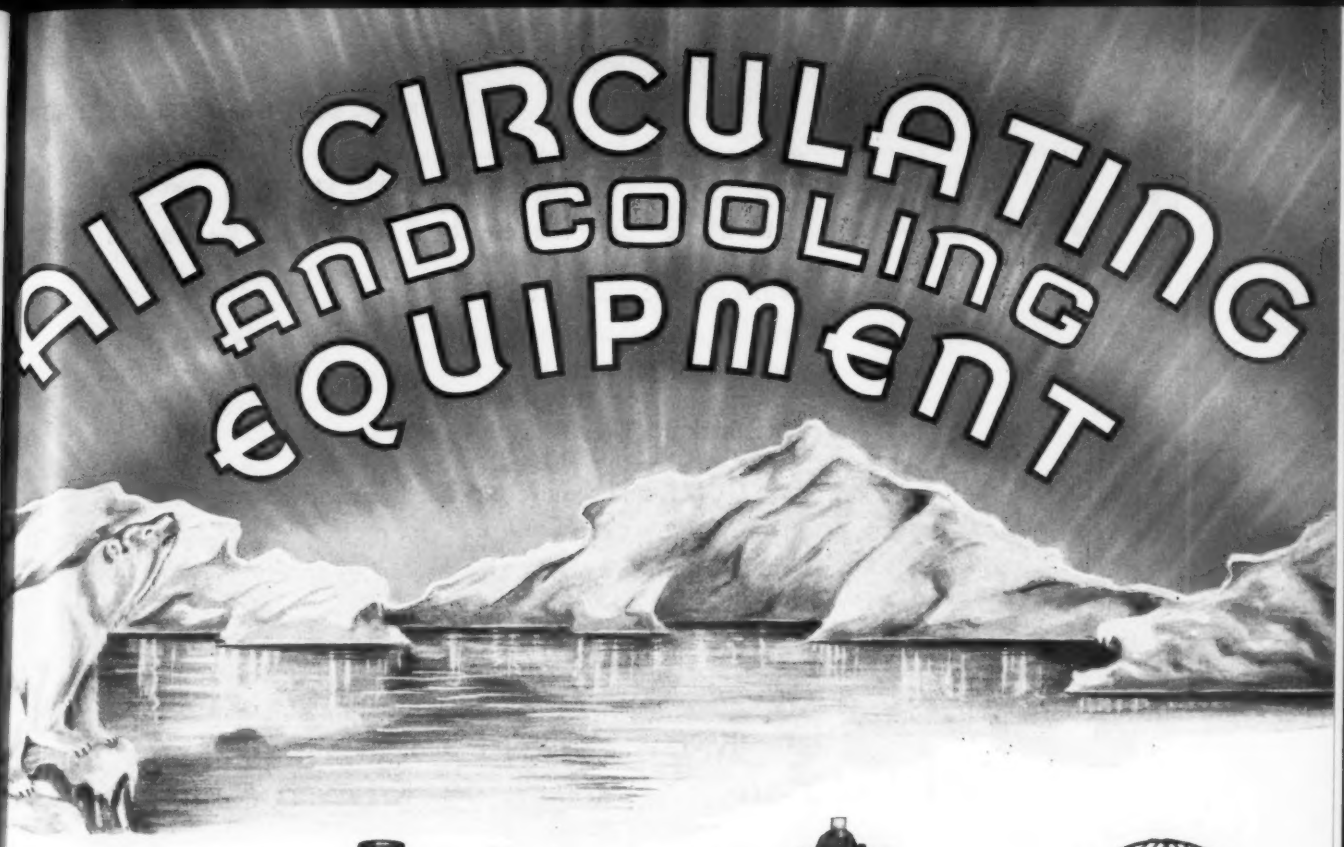
Carolina Power Elects Vecker Vice President

S. P. Vecker, general sales manager of the Carolina Power and Light Company, Raleigh, N. C., since 1935, has been elected a vice president of the company, according to an announcement by L. V. Sutton, president. The election of Mr. Vecker occurred at a meeting of the board of directors of the company in Raleigh.

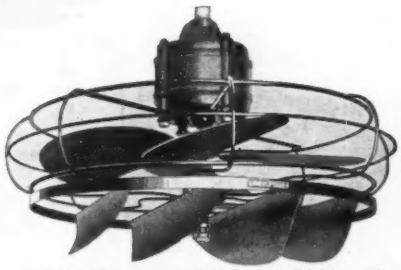
A graduate of Yale University, Mr. Vecker is a veteran of 27 years' experience in the utility business. For several years, Mr. Vecker served as chairman of the Sales Section, Southeastern Electrical Exchange, and for the past year he has been chairman of the Edison Electric Institute's dealer-sales development committee.

Much of the success of the sales promotional program of the Florida Public Service Co., is attributed by B. G. Duncan, advertising manager, to their plan of meeting with the various jobbers in the territory and discussing proposed plans with them before presenting them to the dealers. Gathered about the table for such a discussion, from left to right, are Mr. Duncan, J. C. Stuart, Raybro Electric Supplies; Curtis Logan, Westinghouse Electric Supply; D. B. Clark, General Electric; Robert McAllister, Major Appliances, Inc.; K. H. Hill, Graybar; J. B. Peebles, General Electric Supply; H. B. Zimmerman, General Electric Supply; R. J. Brendell, General Electric Supply; W. G. Davenport, General Electric Appliance Co.; B. H. Boatner, Westinghouse Electric Supply; R. H. King, Byars-Fogry Refrigerator Co.; C. F. Lucas, Westinghouse Electric & Mfg. Co.; W. W. Snow, electrical sales supervisor, Florida Public Service; and A. H. Bruning, commercial manager, Florida Public Service.

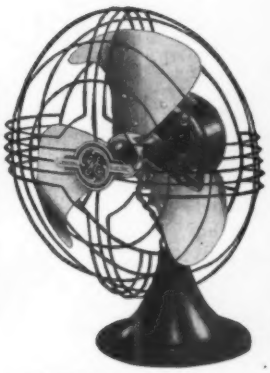
AIR CIRCULATING AND COOLING EQUIPMENT



HUNTER Adaptair Hotel Type 52" Ceiling Fan. Instantly adjustable for either up or down draft. Hunter Fan & Ventilating Co., Inc.

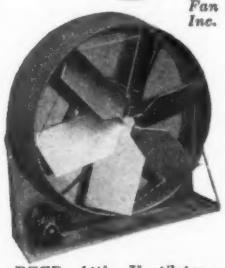


VICTOR Overheads, FS-5Q and FS-6Q, with the revolving "Breeze-Spreader" (finger tip control for degrees of air spread) delivers breezes evenly without drafts over a wide floor area. 12 and 16 inch sizes. Victor Electric Products, Inc.



GENERAL ELECTRIC Super-Quiet Fan (oscillating and non-oscillating) with the new scientifically shaped and pitched Vortalex blades for greater air movement and quieter operation. Streamline guard design. General Electric Co.

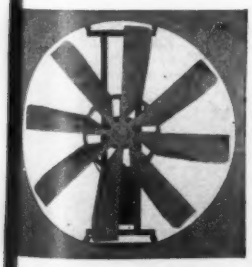
SIGNAL'S Deluxe streamliner. Desk Type Fans available in a range of sizes from 8" to 16" in both AC Induction and Universal models. Signal Electric Mfg. Co.



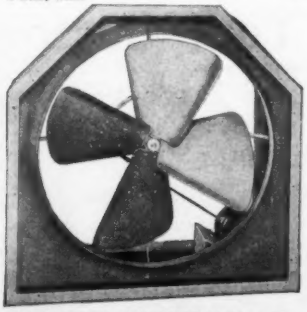
REED Attic Ventilator. Rubber mounted Century motors. Oilless fan shaft bearings. Certified ratings. Exceptionally quiet operation. Reed Unit-Fans, Inc.

Advertisers In This Section

American Coolair Corp.
Autovent Fan & Blower Co.
Buffalo Forge Co.
General Electric Co.
Hunter Fan & Vent. Co., Inc.
Reed Unit-Fans, Inc.
Signal Electric Mfg. Co.
Schwitzer-Cummins Co.
Victor Electric Products, Inc.
Westinghouse Elec. & Mfg. Co.

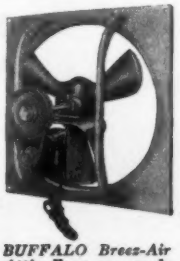


COOLAIR'S improved home-cooling fan for 1940—all moving parts "float" in larger, sound-absorbing springs. Ultra-quiet, easy to install, lightweight steel frame and blades, long hour service motors. 12 sizes for homes, 16 for commercial jobs. American Coolair Corporation.

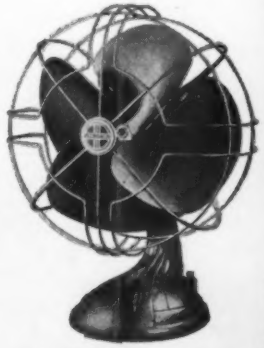


SCHWITZER-CUMMINS Cabinet Model Home Ventilator. 30", 36", 42" and 48" diameters. 7,000 to 20,500 C.F.M. All welded construction. Cabinet insulated for sound proof operation. Fan has discharge shroud to aid efficiency. Schwitzer-Cummins Company.

COOLVENT Attic Fans with Certified Rating. Handles more air at slower speeds and with more quiet operation. Twin rubber mounted ball bearing pillow blocks and resilient base, semi-enclosed motor. Autovent Fan and Blower Co.

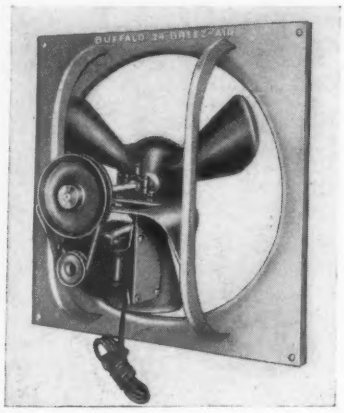


BUFFALO Breez-Air Attic Fans are made in a complete range of sizes, capacities from 4,000 to 17,000 c.f.m. This line features quiet operation, requires no springs or other special mountings. Buffalo Forge Company.



WESTINGHOUSE "POWER AIRE — Ultra-Quiet Micarta blades, current-saving Capacitor motor, and Hamor-bronze finish. Provides "Hushed Coolness." Westinghouse Elec. & Mfg. Co.

Are Attic Fans PROFITABLE ?



Buffalo dealers say "YES"!

It's significant—Buffalo BREEZ-AIR dealers seem to be well satisfied with their line. BREEZ-AIR Fans are not cheap—in fact, they cost more than many other fans on the market. They ARE built, however, to give CUSTOMER satisfaction—they handle their RATED CAPACITY—they are QUIET, and require practically no servicing.

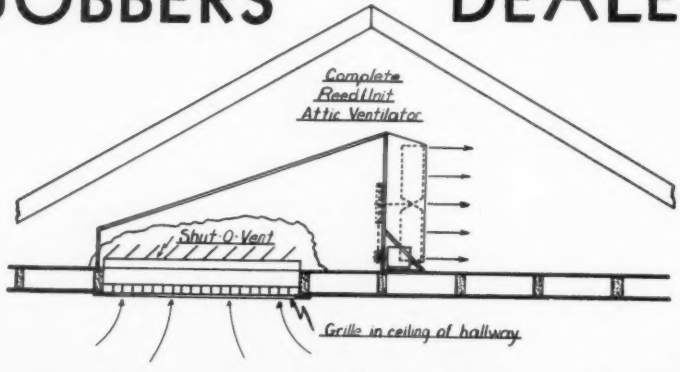
If you want to sell a line of attic fans with real profit possibilities, with an exclusive protected territory—write for details.

BUFFALO FORGE COMPANY
210 Mortimer St., Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

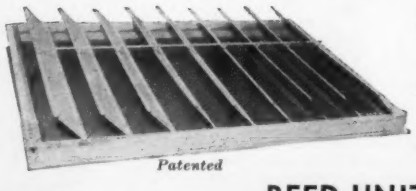
"Buffalo" Sell the Fan with no headaches—

BREEZ-AIR ATTIC FAN

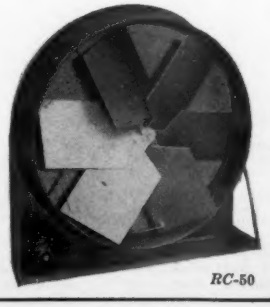
JOBBERS AND DEALERS



Four Good Reasons Why Your Customers Buy REED UNIT-ATTIC SYSTEMS


Patented

1—Venturi-Cone fan case for highest efficiency.
2—Certified Ratings by an approved unbiased testing laboratory in accordance with test code of A. S. of H. & V. E. and National Fan Mfrs. Assn.
3—Reed automatic Shut-O-Vent regular equipment —for all Reed Attic systems. A substantial steel shutter—not a flimsy aluminum louvre.
4—Blade-Flex Equalizers an exclusive new blade improvement for quiet and efficient operation.


RC-50

Factory:
501 N. St. Patrick St.

REED UNIT-FANS, INC.
Manufacturers of Ventilating Equipment
New Orleans, La.

Sales Office
811 St. Charles St.

very house needs
estinghouse

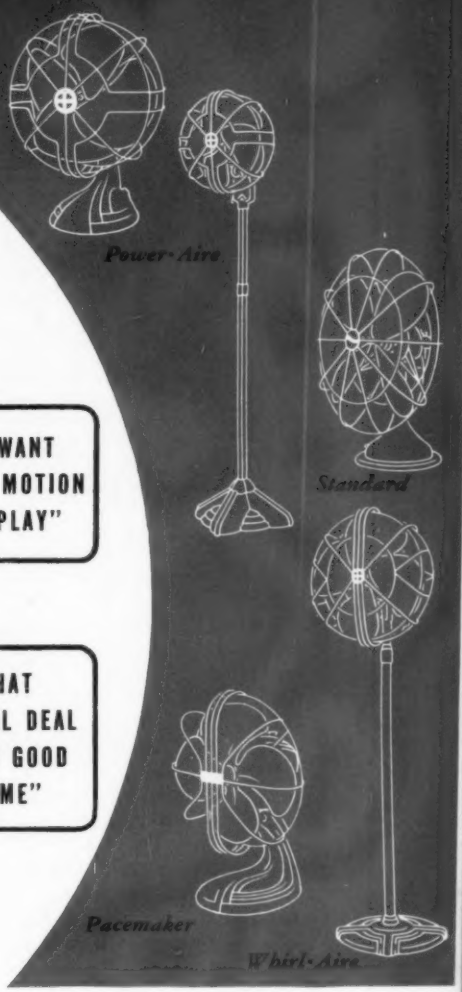
USHED COOLNESS

WESTINGHOUSE FANS
for '40

"A SWELL FAN LINE"

"I WANT THAT MOTION DISPLAY"

"THAT SPECIAL DEAL LOOKS GOOD TO ME"



START HERE TO CASH IN ON A "HOT" FAN DEAL

U CAN POCKET EXTRA PROFIT IF YOU ACT QUICKLY

w is the time to plan for *profitable* business in '40. This complete, t-hitting Westinghouse Fan selling gram is ready now. It offers you the oldest and best-known name in , (2) a streamlined, simplified, *quality* line, (3) certain *PROFIT* and a kick-off deal with *extra* profit for quick action, (4) a complete package of *free* sales helps. Your Westinghouse representative is bringing this program to you now. Don't miss it!

GET THIS FULL COLOR **MOTION DISPLAY!**

ASK YOUR DISTRIBUTOR

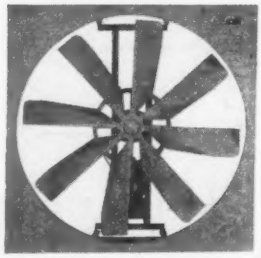
Westinghouse Long-Life Fans

"The Line of Least Resistance"

Sell Coolair

. . . . AND

Keep Your Customers!



NO matter where you look, you can't match the new Coolair attic fan for Quietness, Quality and Customer Satisfaction. And there's nothing so important to the success of your business as satisfied customers.

Sound-absorbing, *built-in springs* that eliminate vibration noise . . . permanently silent ball bearings in fan hub, needing grease only once every three years . . . light, compact steel construction throughout . . . certified air ratings . . . economical operation . . . five year factory guarantee . . . these are features that sell Coolair fans for you and keep your customers happy.

Join up with Coolair, pioneer manufacturer of attic fans, and reap golden profits in the rich home-cooling field this summer. Every home owner is a prospect, every buyer a booster.

WRITE or wire today for this FREE illustrated catalog full of sales helps and profit ideas. Don't delay! Get ready now to make money with Coolair this summer.

MAIL THIS COUPON TODAY!

Please tell me how I can make money with Coolair this summer.

NAME .....

ADDRESS .....

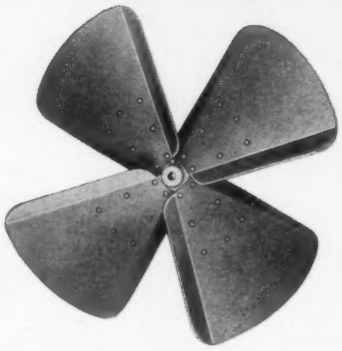
CITY ..... STATE .....

Coolair Ventilating and Cooling Systems

AMERICAN COOLAIR CORPORATION

Manufacturers . . . . JACKSONVILLE, FLORIDA

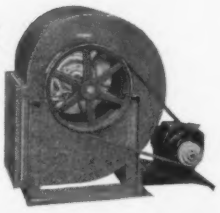
BUY A POWERFUL, SILENT, CODE TESTED FAN BLADE FOR YOUR ATTIC FANS



SIMPLIFY YOUR MANUFACTURING AND SAVE MONEY

Our standard Attic Fan Blade is offered to the industry in all of our regular sizes and capacities. The 30″, 36″, 42″ and 48″ Fans have a delivery range from 7,000 C.F.M. to 20,500 C.F.M.

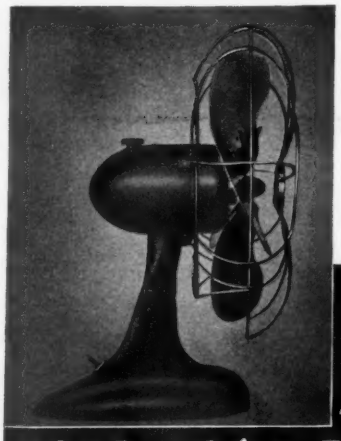
Quiet, efficient Attic Fan Blade Assemblies, carefully balanced and sturdily built assure you a highly saleable unit. Write us for further information and prices.



AIR CONDITIONING BLOWERS

4½″ to 50″, Single and Double Inlet, catalog available.

BLOWER DIVISION
SCHWITZER-CUMMINS COMPANY
125 FAN STREET INDIANAPOLIS, U. S. A.



List Price
$9.95

* NEW an ideal leader for YOUR 1940 FAN LINE

Here's a streamline 10 inch COOL SPOT oscillating fan that through the use of heavily pitched, quiet type fan blades and slow speed Induction motor delivers 610 C. F. M. and is unusually efficient and quiet . . . adjustable for oscillating or non-oscillating operation. Its other features mark this fan as dependable quality at the right price. See your jobber now, or write for complete details.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.
Branch Offices:
W. E. Hopper
857-59 Marietta St., Atlanta, Ga.
Geo. E Anderson
Santa Fe Bldg., Dallas, Texas

SIGNAL

THAT'S THE G-E FAN STORY FOR 1940

IT'S a simple story too—a fine, dependable product backed by a name respected by both dealer and user.

And when you have that combination it's easily translated into profits.

Put yourself in line for these profits. Get the full story from your nearest G-E Fan distributor—but get it fast if you want to be in on the 1940 program.

And here's a good tip—make certain your distributor's salesman takes the wraps off the G-E 1940 Fan Portfolio the very next time you see him. We've called it "A Sweet Set-up!" . . . . . and it is!

And there's a plus you can't ignore—the dominant, colorful, National magazine advertising which month in and month out helps maintain user acceptance and keep the G-E name constantly in the limelight!

Help yourself to sales with this powerful promotion! Free with your initial G-E Fan order.

1. A full-color "stopper" display designed to catch the eye—and hold it!
2. Smart catalogs full of selling facts!
3. Direct-mail pieces to help build your volume!
4. Convincing ready-made newspaper mats for local use!
5. Powerful national newspaper ads in over 175 key cities—run at the best time to sell fans—in local hot weather!

G-E Fans are Going Places — Doing Things in 1940!

Fan Sales Section, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

Inspectors

Kentucky Inspectors Hear Code Authorities

The Kentucky Chapter of the International Association of Electrical Inspectors, in connection with affiliated electrical contractors, held their twelfth annual meeting at the Kentucky Hotel, Louisville, on January 18 and 19.

Among those who addressed the inspectors meeting were Arthur L. Abbott, of NEMA, who spoke on "The Practical Application of the Branch Circuit and Feeder Rules in the National Electrical Code." Mr. Victor H. Tousley, national secretary, IAEI, discussed the changes approved recently for the 1940 edition of the National Electrical Code.

"Light and Power Wiring," was the subject of a talk and demonstration by A. B. Smedley, of the Anaconda Wire and Cable Company. A. Penn Denton, consulting engineer, New York, addressed the group on "Information on Recent Developments in Building Wire."

Of special interest was the demonstration presented to the group of flame test and other tests in connection with factory inspection and label service on non-metallic sheathed cable. This discussion and demonstration was presented by Norman H. Davis, Jr., service engineer, Underwriters' Laboratories, Chicago.

The new officers elected at the meeting were as follows: chairman, Robert J. Heffernan, electrical contractor, Louisville; vice chairman, R. W. Wilson, Kentucky Utilities Co., Lexington; and secretary-treasurer, Victor F. Knadler, Louisville. The executive committee will include, in addition to the officers, H. E. Hischemiller, Bromley; R. A. Rearden, Indianapolis; R. J. Seiler, Covington; E. H. Rueppel, Louisville; H. M. Nazor, Lexington; and R. E. Barry, Louisville.

Georgia Inspectors Meet in Savannah

Fifty or sixty members and guests of the Georgia Chapter, International Association of Electrical Inspectors, are expected at the annual winter meeting of the Chapter to be held in the DeSoto Hotel, Savannah, Ga., February 9 and 10.

Several nationally recognized code authorities will be presented on the program which will cover a wide range of topics relating to the National Electrical Code and its application. Of particular interest will be several talks outlining changes approved by the electrical committee for the 1940 revision of the code.

Among those who will participate in the Chapter's program will be Victor H. Tousley, national secretary, I.A.E.I., Chicago; Arthur L. Abbott, National Electrical Manufacturers Association, New York; J. Warner Pyles. utilization division, Rural Electrification Administration, Washington, D. C.; A. Penn Denton, consulting engineer, New York; George B. Sawin, National Electrical Manufacturers Association, New York; Howard H. Weber, United States Rubber Company, New York; Joseph Whitner, Southeastern Underwrit-

Be Sure The . . .
ATTIC FANS
You Install Have CERTIFIED RATINGS
Investigate The New 1940
COOLVENT
Send for New Bulletin, Now!
AUTOVENT FAN & BLOWER CO.
1825-27 N. Kostner Ave., Chicago, Illinois

ers' Association, Atlanta; Dewey Johnson, superintendent of electrical affairs, Atlanta; Robert Wardle, sales department, Georgia Power Company, Atlanta; and T. J. Fleischer, sales manager, Walker Electric Company, Atlanta.

Southern Section Drive For Membership Continues

The membership drive of the Southern Section, International Association of Electrical Inspectors, begun in September, is producing substantial results, according to announcement by Joseph Whitner, secretary-treasurer of the section.

Members who have submitted and endorsed new member applications since the drive began in September are as follows:

Armstrong, W. E.	New York, N. Y.	1
Bommer, A. J.	Dallas, Texas	3
Bowry, T. W.	Richmond, Va.	1
Branch, T. P.	Atlanta, Ga.	3
Bulls, Claude V.	Norfolk, Va.	2
Camus, Frank G.	Shreveport, La.	1
Cannady, N. E.	Raleigh, N. C.	1
Dunn, W. Edward	Alexandria, Va.	1
Goodson, Fred	Houston, Texas	2
Hancock, A. E.	Austin, Texas	1
Hendricks, R. B.	Llano, Texas	8
Johnson, Dewey	Atlanta, Ga.	1
Knoderer, H. G.	Bridgeport, Conn.	1
Miller, G. M.	Richmond, Va.	4
Muller, P. L.	New Orleans, La.	1
Muths, S. L.	Gulfport, Miss.	1
Pockrus, L. S.	Tyler, Texas	1
Pyles, J. Warner	Washington, D. C.	2
Ragner, C. M.	Hondo, Texas	1
Segall, B. Z.	New Orleans, La.	2
Taylor, W. R., Jr.	Atlanta, Ga.	1
Wheeler, Chet	New Orleans, La.	2
Whitaker, C. S.	Durham, N. C.	2
Whitner, Jos.	Atlanta, Ga.	4
Zimmer, Chas. S.	Houston, Texas	1
Miscellaneous	(not endorsed)	11
Total		59

Associations

Commercial Lighting Equipment Contest

Through the Electrical Association of New Orleans, a cooperative commercial and industrial lighting campaign was conducted from October 1 to December 16, 1939. Industrial and commercial salesmen of New Orleans Public Service, Inc., aided electrical jobbers, jobbers' salesmen and electrical contractors in their efforts to secure increased sales during the campaign.

The activity was built around a contest, with cash bonuses awarded for each new or relighting job which met the standards established for the activity. One hundred points were awarded for each such job secured, with an additional twenty points for each fixture sold and installed on the job. Where the lighting installation was such that the footcandle level was well above the established standards, an additional fifty points per job was awarded.

These points were credited to the man securing the order, whether it be a jobber's salesman or a contractor. However, where both worked jointly on a job, the points could be divided between them if both so desire. A quota of 2,500 new lighting fixtures was set for the campaign.

Lighting other than that supplied by general interior fixtures using Mazda lamps is credited on the basis of the equivalent one lighting fixture for each 300 watts of installed capacity. This includes cove lighting, showcase lighting, floodlighting, spotlighting.

Where requested by any contractor or salesman registered in the contest, the utility made trial installations of interior lighting fixtures (provided this did not necessitate a wiring change). Floodlighting demonstration trucks were also available to contestants who had well developed prospects for this type of lighting.

The utility company also made available prospect lists, broken down according to different business classifications. These lists were available to interested jobbers and contractors and, under certain circumstances, the utility addressed mailing pieces for participants without charge.

The New Orleans Public Service issued 10,000 mailing pieces calling attention to the value of proper lighting, 7,000 of these going to commercial customers and 3,000 to industrial customers.

New Officers Selected For Dallas Elective Club

At the annual meeting of Dallas Electric Club, Dallas, Texas, held December 18, new officers were elected to serve during 1940. C. F. McAuliff is president, and G. L. MacGregor is first vice president. W. W. Lynch is second vice president.

Reports made by the secretary and treasurer showed that the club has more than 200 members and is in splendid shape financially. 1939 has been an active year for the club, with luncheon meetings held each Monday, except during the summer months and the Christmas holiday season.

W. C. Blair C. F. McAuliff

Mr. McAuliff is vice president of Texas Electric Railway Company; Mr. MacGregor is vice president of Dallas Power and Light Co.; the second vice president is W. W. Lynch, vice president of Texas Power & Light Co.; secretary is Walter C. Blair, of Texas Power & Light Co. (re-elected); and treasurer is M. F. Larmer, advertising manager of the General Electric Company in Dallas (also re-elected).

New directors are A. F. Hamm, retiring president; W. H. Duls, Southwestern Bell Telephone Company; R. G. Berle, Westinghouse Electric Supply Co.; Glen C. Wasson, General Electric Supply Corp.; and W. B. Clayton, General Electric Corp. Holdover directors are R. T. Shiels, H. K. Handley, G. B. Richardson, W. R. Burns and Al B. Emrick.

Palmer Chosen to Head Charlotte Engineers

Roy A. Palmer, illumination engineer, merchandising and advertising and assistant manager of the Duke Power Co., was recently elected to the presidency of the Charlotte (N. C.) Engineers Club to succeed Maurice G. Townend.

Other officers chosen at the luncheon meeting were George O. Bason, vice president; W. B. White, secretary, and C. N. Underwood, who was re-elected as treasurer. The new board of directors is composed of H. H. Hill, Channing B. Brown, W. W. Hanks, Edward W. Clark and Mr. Townend.

The engineers heard an interesting address by Dr. Hunter B. Blakely, president of Queens College, who talked on "The Contributions of Engineering and the Resulting Problems."

Wholesalers

Miami Westinghouse Occupies New Home

The Miami, Fla., branch of the Westinhouse Electric Supply Co. recently has moved from its quarters at 1036 No. Miami Ave. to a new building at North Miami Ave. and Sixth St. Almost in the heart of the downtown business section, the new location gives the branch vastly improved facilities in all departments and much larger floor space.

Of concrete and steel construction and finished in sun-tinted stucco, the new building provides Westinghouse with approximately 20,000 square feet of floor area. A display room, the accounting department, service counter, and heavy supply department, occupy most of the ground floor, the remainder of which is divided into store spaces. The entire second story, reached by a new type of rotary lift elevator, is used for general warehouse purposes.

The branch has a 3-car railroad siding at the rear of the building and, on the East side, a 30-space parking lot for customers' convenience.

To facilitate service at the counter, which can be closed off at will from the display room by a vertical sliding door, bins for the smaller items are lighted by stack-and-bin luminaries. Suspended steel adjustable dividers, instead of fixed stanchions, provide better racking of conduit stock.

Throughout the building "Nofuze" breakers have been used. "Magnalux" fixtures in the offices and "Storelite" in the display room illuminate this portion of the main floor, which is surfaced with asphalt tile in red and brown squares.

A plug-in strip, provided with outlets spaced 18" apart, facilitates the demonstration of appliances, as the show room is intended as a convenience for dealers and contractors. For the benefit of the latter, a clever display of indirect, semi-indirect and direct lighting fixtures has been arranged above the service counter at the end of the display room opposite the entrance. Each fixture of the eight types shown is housed in a separate straw tinted recess for effective display.

C. R. Lee, manager of the Miami branch, has been in charge since its opening in 1935, when he was transferred from the company's Jacksonville office. Included in the branch personnel are F. Gross, office manager; Ward Grantham, E. Magann, Geo. Wygant and V. C. Clement, sales department.

Among company officials present from the Atlanta regional office at the formal opening of the company's new Miami quarters were W. A. Emerson, district manager, W. N. Kennon, sales promotion manager, R. F. Anderson, district auditor, and C. F. Lucas, of the range and water heater division.

C. R. Lee

New Distributors Appointed

The Stratton-Warren Hardware Company, Memphis, Tenn., has been appointed distributor in the Memphis trading area, for the entire Hotpoint home appliance line according to an announcement made recently by R. W. Turnbull, vice-president and sales manager for Hotpoint.

L. M. Stratton, Jr.

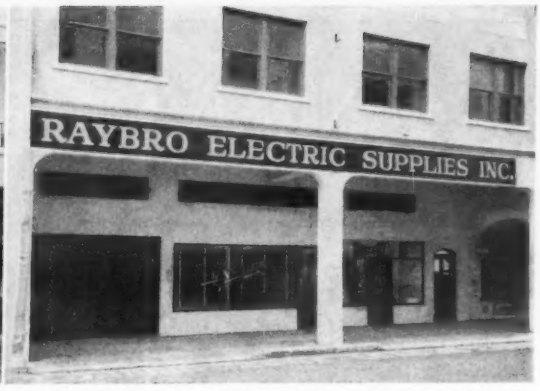
This concern has been one of Memphis' prominent wholesale houses for forty years. Leslie M. Stratton, Jr., executive vice-president, will personally supervise distribution of Hotpoint products. Leslie M. Stratton, president, is a past president of the National Wholesale Hardware Ass'n., and the Southern Hardware Jobbers Ass'n., and is at present a member of their advisory board.

* * *

Ben S. Gambill, president of the Braid Electric Company, Nashville, Tennessee, announced recently their appointment as distributors for the complete Norge line of major appliances as manufactured by the Borg-Warner Corporation of Detroit. The Braid Co. were one of the first Norge distributors back in 1930.

The Braid organization covers Middle Tennessee and Southern Kentucky and prospects are bright for the sale of major appliances in that section.

P. E. Griffith, vice president of the Braid Electric Company, is in complete charge of territory sales, and Arthur Boyd, an old-timer in



the appliance field, looks after the city accounts.

In addition to the Norge line, they handle Zenith radio receivers.

* * *

Virginian Electric Inc., of Charleston, W. Va., has been appointed a wholesale distributor in the Charleston area for General Electric domestic refrigerators, ranges, water heaters, and kitchen equipment. It had previously been responsible for the distribution of the following products only, which are retained: G-E cleaners, electric clocks, fans, heating devices, home laundry equipment, radios, insulating materials, Deltabeston wires and cables, wiring materials, and automotive products.

Graybar Appoints Moorefield Winston-Salem Branch Manager

W. A. Moorefield has been appointed branch manager at Winston-Salem for the Graybar Electric Company, Inc., according to recent announcement. Mr. Moorefield,

whose appointment was effective January 1, has served with Graybar for thirteen years in various sales capacities throughout the Southern area.

Raybro Opens Miami Branch

Raybro Electric Supplies, Inc., electrical appliance and supply wholesalers, who operate branches at Tampa and Jacksonville, have opened a new branch in Miami, Fla.

Fronting 55 feet on North Miami Avenue between Tenth and Eleventh Sts., the Miami branch occupies a steel and concrete, stucco finished, two story building of approximately 12,000 square feet in area.

Since the redecoration of its new display rooms had not been completed when the branch was opened, its initial showing of major and small appliances was held under the direction of J. A. Meier, the company's general sales manager, on the mezzanine floor of the Alcazar Hotel, November 6 to 9.

This was the final presentation in a series of sectional fall displays conducted by Raybro for the purpose of familiarizing its dealers with the company's full line and with its merchandising plans for the coming selling season. All of these showings have been given in hotels and in order to cover, as far as possible, the firm's entire dealer list, they have been held in a number of Florida and South Georgia cities. Motor trucks, finished in crimson and attractively lettered in gold, were used to transport the display from one exhibit to the next. One of these trucks is now assigned to service at the Miami branch.

W. R. Young, formerly a member of the company's sales force at Tampa, is in charge of sales at the new branch, and Ned H. Morgan, transferred from Jacksonville, has supervision of service.

The officers of the Raybro company, which maintains its headquarters at Tampa, are M. H. Mabry, president, Troy A. Brown, vice president and general manager, and J. H. Bragg, secretary-treasurer.

Among the appliance lines distributed by Raybro to approximately 500 dealers are Gibson refrigerators and ranges, Clark and Rex water heaters, Stromberg-Carlson radios and Emerson fans.

Virginia Wholesaler Expands Business

Continued improvement in business has made it necessary for the West Virginia Electric Company of Huntington, W. Va., to expand its place of business by taking in the adjacent sales room on Fourth Avenue. Operating a wholesale business in electrical supplies, lighting fixtures, and miscellaneous electrical equipment, the West Virginia Electric Company, headed by Joseph Colker and Charles Mandell, has just completed its fourth year in business.

The company handles a number of well known electrical lines such as Leviton devices, Triangle wires and cables, Palmer safety switches, and M. B. Austin electrical supplies.

New Manager for Norge Southwest Sales Company

E. C. Kinsloe, sales promotion and advertising executive, has been appointed district sales manager for Norge Southwest Sales Company of San Antonio, Texas, according to an announcement by W. C. Bowles, president. In addition to his sales work, Mr. Kinsole will have charge of advertising for the firm.

MANUFACTURERS' News

Fewer Models, Lower Prices Feature G-E 1940 Lines

Stressing the "inside story" of selective air conditions to a greater extent than ever before through the introduction of controlled humidity and a newly developed air filter, General Electric has presented three new lines of refrigerators for 1940 which offer in many models increased capacity and operating efficiency over last year's models in addition to greater food-preserving ability. Thirteen new models are offered in the three regular series, in addition to three miscellaneous models retained from 1939.

Particularly outstanding in the new group is a low-priced eight-cubic-foot model designed particularly to suit the needs of rural customers.

The over-all theme for the 1940 General Electric refrigeration story is embodied in the statement—"We believe you cannot buy a refrigerator that will cost you less to own than a General Electric."

Summarizing the emphasis that has been placed on food preservation and low operating cost in developing the new line, rather than on marked exterior changes and auxiliary equipment, the statement will form the spearhead of the entire selling and promotional campaign during the year.

Considered from the angle of capacity alone, the new lines consist of a "four," three "fives," four "sixes," three "eights," a "twelve" and a "sixteen." The classifying figures represent the capacity in cubic feet only approximately, since in many cases the capacity has been increased over comparable models of last year.

Further improvement in the Calrod high-speed surface unit, which is the heart of the General Electric range, leads the listed features of the 1940 G-E range line now being presented to dealers throughout the country. Changes in the line, announced by J. R. Poteat, manager of the Water Heater-Range section, primarily reflect demands by the industry and the public for fewer models, lower prices, and strong demonstrable features which will carry the story of modern electric cookery into new markets and new homes.

Four classifications of ranges are featured in the new line—a de luxe series of two models with Tel-a-cook lights to signal the different switch stages of position in color at a glance and "Tripl-oven" with Calrod oven units; a master series, of three models, with all-porcelain body and striking new styling; a special series of two models, designed for specific campaigns; and one model which to date constitutes the apartment line, designed for large capacity in small space. In addition to the eight new models, the large G-E "Imperial" range is retained in the line without change.

New Calrod "clean speed" surface units, each having five operating speeds, are this year standard equipment on all G-E ranges. For the two top models in the de luxe series a new high-speed five-heat thrift cooker has been developed which has greater cooking speed and hence many more uses than the 3-heat cooker. The uses of the cooker have been embossed on all cooker lids, to make the use of this economical device more widely known. A redesigned cooking top, automatic oven lighting, bright-finish oven shelves, and new accessories are among the other new features.

Frigidaire Introduces 1940 Major Appliances

More convenience for the user, plus a wider choice of models with new beauty, feature the 1940 Frigidaire electric range line, it is announced by the Frigidaire Division, General Motors Sales Corporation, which is introducing its new ranges several weeks earlier than heretofore.

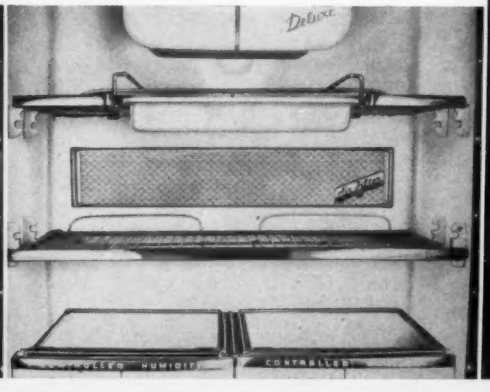
Also being introduced is Frigidaire's 1940 line of electric water heaters which this year is enlarged by the addition of three new models designed primarily for installation where low price is a predominating factor. All operating features of the three new water heaters are the same as those in the standard Frigidaire units.

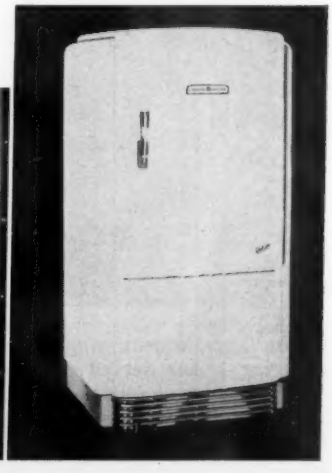
Sweeping improvements in economy, utility, operation, and appearance, which includes the introduction of color, together with a revision of lines that offers a broader coverage of the entire consumer field, are the outstanding developments introduced in 1940 Frigidaire electric refrigerators.

One of the new ranges added to the 1940 Frigidaire lines is a deluxe model incorporating two complete ovens. Another is a new specially designed, low priced standard base model which, it is stated, has a zone 2 suggested retail selling price of $129.75 yet at the same time includes exclusive and basic Frigidaire electric range features that will appeal to buyers in the low-priced field. Including two combination ranges, there now are 10 models in the Frigidaire electric range line.

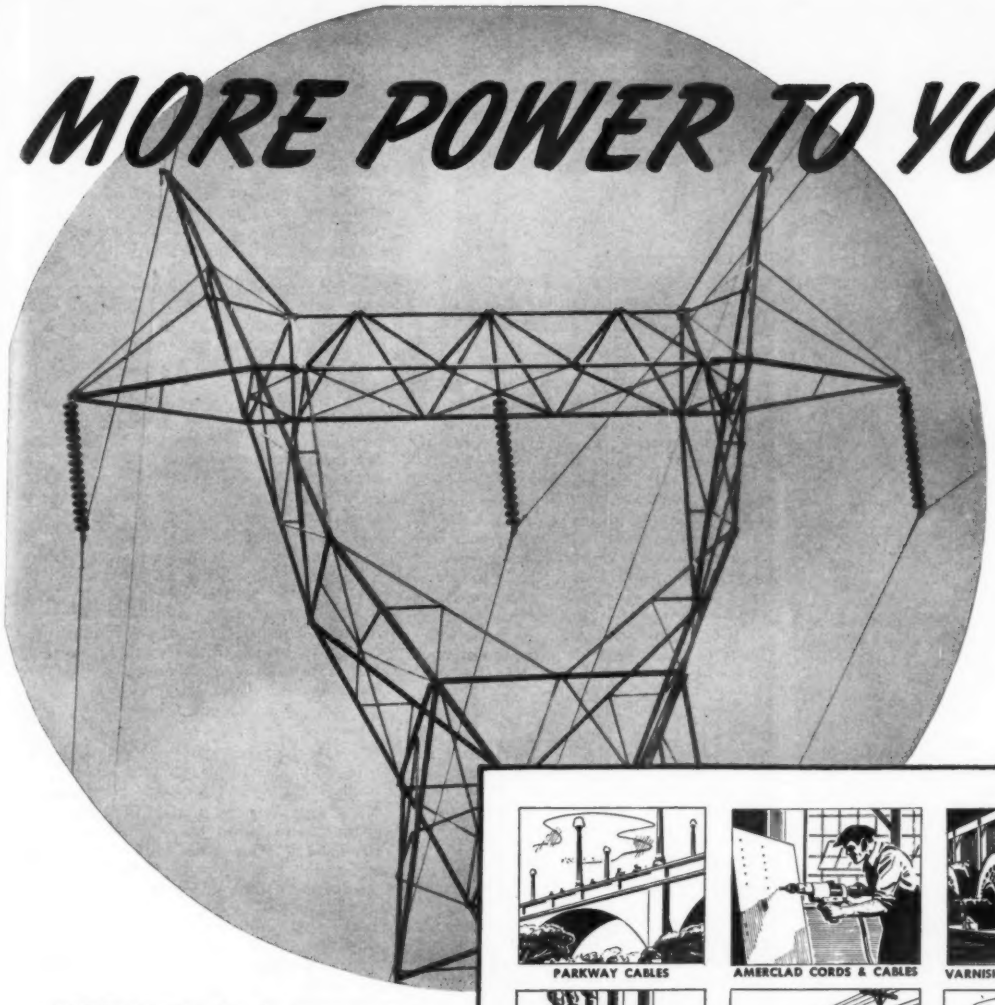
Designed to meet a demand for a range with twin ovens, the B-70, the new deluxe model, has every feature to simplify all cooking operations. Baking capacity is greatly enlarged by the addition of the second oven

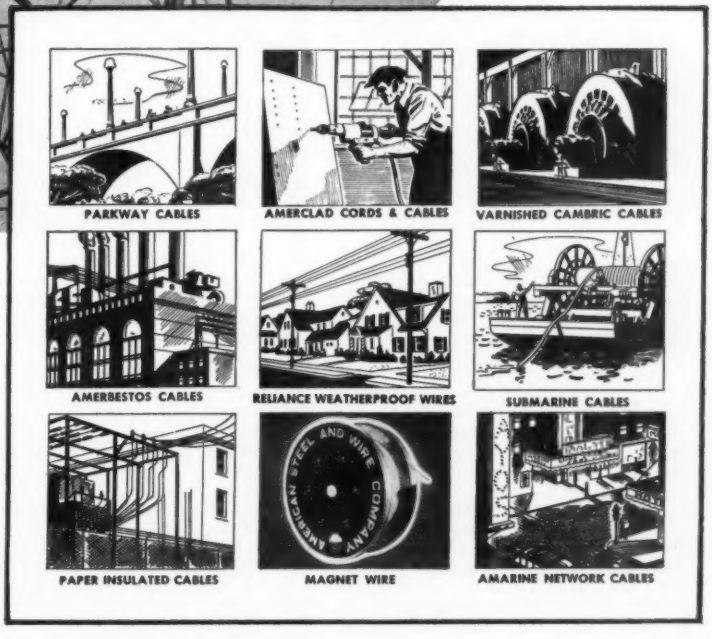
Fewer models, lower prices, and strong demonstrable features are emphasized in General Electric Company's announcement of new 1940 line of ranges and refrigerators. Shown at left is the "Chancellor" range of the deluxe series, Model DD-40. At right is the 1940 deluxe refrigerator, Model PB-8-40. The center photo shows location of the removable air filter which removes food odors.





MORE POWER TO YOU!





TRACE the developments made in the electrical wire and cable field and you trace the history of the American Steel & Wire Company. For more than a century we have been developing new products, as well as improving and modernizing the old. During more than 100 years of wire making we have encountered innumerable problems in a field notable for progress and invention. In that period we have built up a background of experience that is always at your service.

ADEQUATE WIRING SERVES AND SAVES

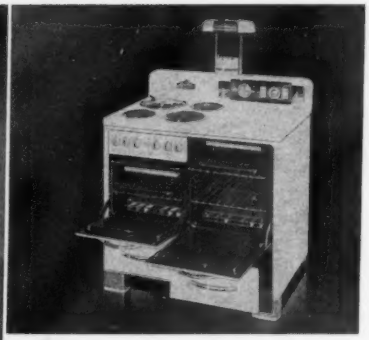
AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Export Company, New York, *Export Distributors*

UNITED STATES STEEL



Frigidaire's new deluxe range, model B-70, offers twin ovens in addition to many other features designed to add greatly to the convenience of the user. The refrigerator shown here is the new Frigidaire 1940 Cold-Wall "8". It offers gleaming white porcelain finish with chromium trim, and the Cold-Wall method of keeping foods fresh by means of low temperature and controlled humidity. Frigidaire also announces three additions to its water heater line—all of the cylindrical type with solid black bases, 30 to 50 gallons capacity.

immediately below the surface heating units. This oven has two heating units, a 2,700 watt and a 2,000 watt capacity, respectively, which are identical with those in the standard oven and in common with it has the "Evenizer" heat distributor, rust-proof oven lining, oven heat cotrol, non-tilt sliding shelves, three position oven door, and other advantages.

The three new Frigidaire electric water heaters are of the cylindrical type with solid black bases of the same shape. Models are available in 30, 40 and 50 gallon sizes, all having galvanized tanks and a choice of single or double heating units. Cabinets are finished in white dulux. Performance of the new heaters is said to be as efficient as models of the table top and upright type in the Frigidaire line.

A total of 16 refrigerator models is offered this year by Frigidaire in standard and Cold Wall series. The standard series includes a Table Top 3 cubic foot size; Super Value models in 3, 4, 6 and 8 cubic foot sizes; Master models in 5 and 6 cubic foot sizes and Deluxe models in 5 and 6 cubic foot sizes. The Cold Wall series includes Cold Wall Master 5 and 6 cubic foot sizes; Cold Wall Deluxe 6 and 8 cubic foot sizes; and Cold Wall Imperial Porcelain 6, 8 and 12.5 cubic foot sizes. Standard delux exterior finish is used for all lines except the Cold Wall Porcelain models, with all models having stainless porcelain surfaces inside.

While Frigidaire contends that the Meter-Miser rotary compressor has always represented the most efficient, low operating cost type of cold making mechanism, 1940 models are equipped with Meter-Misers that operate at less cost than ever before. This greater economy is made possible through the use of a more efficient motor and a slight re-design of the Meter-Miser construction.

Because of the reception accorded Cold Wall models last year, Frigidaire is retaining the Cold Wall type of refrigeration, and, in addition, is expanding its use into several other lines.

Basically, the 1940 Cold Wall models operate in the same manner as those last year. However, the "dew fresh seal" glass shelf, which acts as a seal between the upper and lower compartments, now is equipped with a humidity control permitting the amount of humidity in the Cold Wall section to be regulated as desired.

Certification Plan for Lighting Fixtures

Thirty-four manufacturers of fluorescent lighting equipment and auxiliaries are now submitting their products to Electrical Testing Laboratory, of New York City, for test and certification. It is expected that the certified products will be marketed under the name of "Fleur-O-Lier" and that a nation-wide advertising campaign will be used to promote their use.

This certification is a cooperative attempt on the part of the manufacturers of luminaires, manufacturers of the lamps and of the utility companies to safeguard the use of the new fluorescent lamps by setting up adequate specifications which are designed to produce lighting equipment which is efficient, durable and safe. The specifications, of course, are still in preliminary stage and will be tentative until more experience has been developed in the manufacturing and use of luminaires built to operate with the new fluorescent lamps.

However, luminaires made under these specifications will reflect the latest in luminaire design for fluorescent lamps and the specifications will be revised from time to time to keep certified luminaires in this position of leadership. Electrical Testing Laboratories has been working steadily for the past year in making tests and in carrying out research, data from which have been sent from time to time to the cooperating manufacturers.

Allis-Chalmers Opens New Transformer Plant

Completion of a modern distribution transformer plant was announced recently by William Watson, vice president in charge of manufacturing, of the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

The new plant is an addition to the company's transformer factory at Pittsburgh, to be known as the River Plant of the Pittsburgh Works, and is laid out and set up for modern line-production operation throughout. Raw materials start at one end, and at the other end the transformer comes off the line not only completed, but fully tested and boxed, ready for shipment.

"Complete equipment," said Mr. Watson, "has been installed in the new plant for testing the transformers by means of artificial lighting up to a million volts in intensity, and only the latest types of machinery are used throughout the plant, including a large bonderizing unit for the protective treatment of transformer tanks, and a battery of automatic seam welders."

This extensive addition to the Allis-Chalmers Pittsburgh Works was designed by the Building Engineering Department of the company under its architect, Carl Meyer.

News About People—

The Okonite Company of Passaic, N. J., makers of insulated wires and cables, announce the appointment of **Richard S. Hayes** as advertising manager of the Okonite Company and Okonite-Callender Cable Company.

Mr. Hayes is a graduate of Princeton, and joined The Okonite Company in 1925. After two and a half years in the factory, he was appointed to the Power and Light Division of the Sales Department working out of the Chicago office. In 1936 he was transferred to the executive office at Passaic to handle various sales promotion activities.

Mrs. Hayes, who is a director of N. I. A. A., is president of the Industrial Marketers of New Jersey.

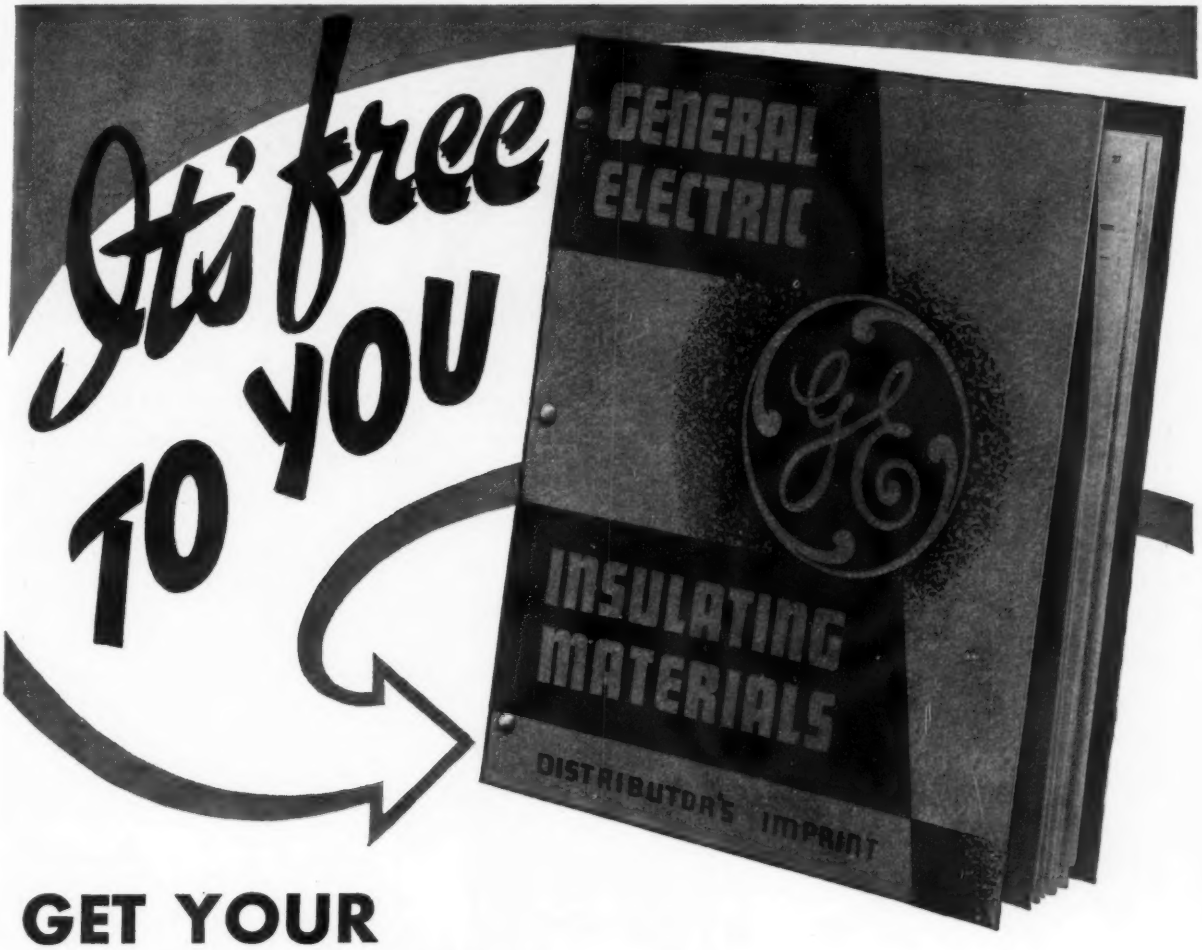
* * *

Appointment of **Reese Mills** as assistant sales manager of the Westinghouse Electric & Manufacturing Company, merchandising division, is announced by **Frank R. Kohnstamm**, sales manager.

Mr. Mills, who for 15 years has been manager of the Westinghouse range and water heater department, will be responsible for co-ordination of the merchandising division's sales activities in his new position. The appointment, which is effective immediately, fills the vacancy created by the recent resignation of Raymond C. Cosgrove.

Mr. Kohnstamm also announced the appointment of **R. M. Beatty**, sales development manager of the range and water heater department since June, 1937, to succeed Mr. Mills as manager of that department.

Mr. Mills is a native of Tunnel Hill, Georgia, graduated from Geor-



GET YOUR COPY NOW

This new General Electric Insulating Materials Catalog ought to be sitting on your desk. Why? Because it's so full of information—information you should have about the insulating materials line which is famous for its completeness and high quality.

You'll get real help from this new G-E Catalog when you're planning purchases for construction, installation, repair, and maintenance supplies.

Chock full of pictures, helpful descriptions, tables, specifications, prices, etc.—that's the best way we can describe this new G-E Insulating Materials Catalog to you.

Just fill in this coupon and shoot it back to us. We'll send you your copy in a hurry.

Section M-0212, Appliance & Merchandise Dept., General Electric Company, Bridgeport, Conn.

Send me a new G-E Insulating Materials Catalog P.D.Q.

Name.....

Company.....

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GENERAL ELECTRIC

Reese Mills

gia Tech. He started with the Westinghouse Electric & Manufacturing Company in February, 1919. He became manager of the range and water department in 1925. In his new capacity he will continue to make his headquarters at Mansfield.

R. M. Beatty

Mr. Beatty, a graduate of the University of Wisconsin, spent four years in the various phases of the range and refrigerator business—manufacturing, wholesale, and retail, before joining Westinghouse in 1930.

His first position with Westinghouse was as sales education supervisor of the refrigeration department. In June, 1937, he came to Mansfield as sales development manager of the range and water heater department.

* * *

A. D. Peabody, Dallas, district manager of Westinghouse Electric & manufacturing Company, recently announced the appointment of **J. H. Tuttle** as sales development manager of the southwest district, with offices in Dallas. Mr. Tuttle, though a former resident of Dallas, has been in North Carolina for several years.

* * *

Under Nash Kelvinator's factory plan of distribution of electrical appliances, **Emmett Webster,** of Birmingham, has been named sales representative in Alabama under **C. R. Brogran,** southeastern division manager, Atlanta. Mr. Webster was formerly with Wimberly & Thomas Hardware Company, former Kelvinator distributor which has now discontinued the appliance line.

Jimmie Johnson, formerly Kelvinator representative in Alabama, has been named Leonard sales representative in Alabama, Tennessee and Mississippi. Magic City Appliance Company formerly distributed the Leonard line.

A. H. Jaeger W. A. Grove Roger H. Bolin

Intensive promotional plans for 1940 have been announced by the advertising committee chairmen of the various sections of the Modern Kitchen Bureau. Left to right, A. H. Jaeger, Hotpoint water heater sales manager, water heater section; W. Arthur Grove, Hotpoint sales promotion manager, range section; and Roger Bolin, Westinghouse appliance advertising manager, refrigerator section.

E. K. Poor, Jr.

C. L. Harrison, president of Victor Electric Products, Inc., Cincinnati, Ohio, has announced that **Edward K. Poor, Jr.,** has assumed the duties of general sales manager for the Victor company effective January 1st. Mr. Poor will be in complete charge of merchandising and sales for Victor circulating fans, In-Bilt ventilators, exhaust fans and heat boosters, and the new Victor ironing machine.

* * *

J. G. Wessels, of the Memphis office of Hunter Fan & Ventilating Company, has been transferred to the Dallas office, as announced by Robert People, president. Mr. Wessels will cover Oklahoma, Arkansas, Dallas and Fort Worth territories. He will be succeeded in the Memphis office by **John Camp,** who is in charge of the repairs and service. Mr. Wessels has been with the company since 1920 and in the Memphis territory about 10 years.

These new officers of the Southwestern Electrical Manufacturers' Representatives Club have taken over their official duties for 1940. Left to right, Carl A. Hausman, Crouse-Hinds, president; E. B. Glenn, Walker Bros. and other lines, vice president; Robert W. Collins, Square D, secretary; and W. F. Watkins, Bussman, retiring president. Mr. Watkins holds the silver cup presented to him as he surrendered his gavel.

HAVE YOUR SALESMEN GOT THE "CREEPS"?

HELP THEM BANISH THOSE "MURDERED SALE WIM-WAMS"

Every one of your salesmen has probably been haunted by the memory of sales that he murdered *after* he had practically signed up the buyer. He knows that these mishaps are usually due to the veto of someone that he *can't get to see.* At times it's a man in the field, or a shop employee who demands a competing product with which he is more familiar. It may be some inaccessible executive who doesn't know the story of your product's advantages.

No matter who knifes the sales, it's a tough mental hazard that your men face each time they approach a prospect. And it's one that you can help to remove by promoting your product's user-benefits, regularly, through the business papers that are edited for the men your salesmen can't get to see, as well as those whose doors are open.

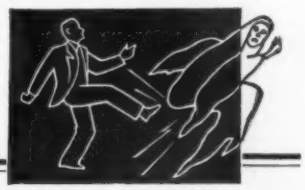
USE THIS GHOST-GETTER

ELECTRICAL SOUTH, edited for the "unreachables," as well as for the men your salesmen *can* see, provides an economical means of cultivating *all* of the principal buying powers in the Southern electrical field.

ELECTRICAL SOUTH is invited to the desks and homes of the men who have "arrived" . . . to the shops, offices and homes of those who want to get ahead.

These men pay subscription cash to obtain the constructive advice of editors in whom they have confidence.

Your advertising in ELECTRICAL SOUTH will reach the men your salesmen can't see; will help to banish the ghosts of murdered sales.



ELECTRICAL SOUTH

Highest editorial standards and publishing integrity ← LOOK FOR THE TWO HALL-MARKS OF KNOWN VALUE → Proved reader interest in terms of paid circulation

New Cory Coffee Brewer

For 1940, the popular 7-8 cup "Royal" model of the Cory glass coffee brewer line has several new features that add to beauty and utility. It has a new handle of ivory-tone bakelite; gracefully modern and giving a firmer grip. The 2-heat electrical unit is streamlined to blend with the flowing lines of the brewer. The stunning decanter cover of polished chromium matches the neck clasp and sets off the other appointments. Capacity of both upper and lower bowls has been slightly increased.

With this and all other models of the Cory, are supplied complete de luxe fittings at no extra cost. They include: decanter cover; dual purpose stand and cover for upper glass; guess-eliminating measuring cup. Cory brewers are equipped with two filters—the "Fast-Flo" using cloth, and the Cory glass filter rod. It can be used for brewing both delicious coffee and tea, untouched by metal. The manufacturer is Glass Coffee Brewer Corp., Chicago, Ill.

Stewart-Warner Ranges

Two new electric ranges are announced by the Stewart-Warner Corporation. Designated as the "Exposition Models," these new Stewart-Warner ranges are designed for featuring in the nation-wide Electric Range Exposition sponsored by the Modern Kitchen Bureau.

Featured as low-priced units, both ranges have been designed along the lines of the standard Stewart-Warner Sav-A-Step line, and include the major features of these established ranges. Both models are streamlined for increased eye appeal and the impression of more compact units. However, there has been no reduction in range capacity.

White Star Range

Four outstanding features are stressed in the striking new 1940 White Star electric ranges, introduced by the Detroit Vapor Stove Division, Borg-Warner Corporation. Two models are produced, designed to fit the requirements of various income groups. Principal features of the new ranges are: full size ovens, extra large storage compartments and convenient control panels that combine four 6-positions, 5-heat switches, and signal oven lights, in a convenient grouping.

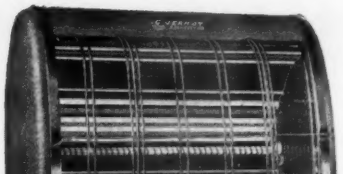
Both of the new White Star models are equipped with four closed Chromolox elements and a 1500-watt cooker well is available at slight extra cost.

The model DE-28 is equipped with a deluxe broiler in a separate compartment, served by a 3400-watt oven element. The broiler on the model DE-26 is in the upper part of the oven and the 3000-watt oven element is moved to the broiling position as necessary.

New Everhot Heater

Combining modern styling with exclusive new principles of operation, the Swartzbaugh Manufacturing Company, Toledo, has added to its line a smart new electric Ray-Vector room heater that gives promise of large sales possibilities. Neat, compact and attractively finished in a warm green tone, this new oval-shaped heater is only 16 inches high and 17 inches wide.

It has a new-type chrome-crescent reflector with 40 reflecting surfaces scientifically arranged to project radiant and reflected heat forward, downward and upward over ample area. It is equipped with an Everhot damper permitting instand change from directed radiant heat to circulated diffused heat. The heater is

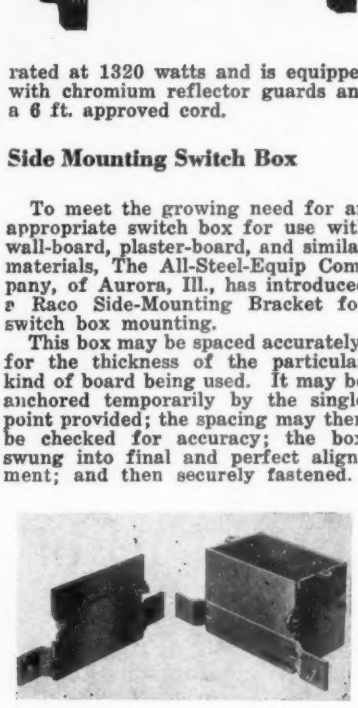


rated at 1320 watts and is equipped with chromium reflector guards and a 6 ft. approved cord.

Side Mounting Switch Box

To meet the growing need for an appropriate switch box for use with wall-board, plaster-board, and similar materials, The All-Steel-Equip Company, of Aurora, Ill., has introduced a Raco Side-Mounting Bracket for switch box mounting.

This box may be spaced accurately, for the thickness of the particular kind of board being used. It may be anchored temporarily by the single point provided; the spacing may then be checked for accuracy; the box swung into final and perfect alignment; and then securely fastened.



The Raco All-Steel Side-Mount is detachable. Assembly is a simple procedure. Just remove the side of the box from the slotted side of the spacer. Slide the box side within the formed lugs of the Side-Mount Bracket, replace the box side, tighten the assembly screw, and the job is done.

Flexible Copper Braid

Flexible copper braid jumpers suitable for carrying instantaneous currents up to 30,000 amperes, such as may be used in heavy welding equipment, are now available from Burndy Engineering Co., Inc., New York. The inner ends of the copper ferrules are belled to prevent excessive stress concentration in the strands as they leave the ferrules. Curved or straight braid assemblies with the ends compressed into a solid mass in the ferrules are available.

Trumbull Magnetic Starter

The Trumbull Electric Mfg. Company, Plainville, Conn., have recently put into production an entirely new design of magnetic starter. Designed as the Type "M-2" Magnetic Starter, it is particularly applicable for the machine tool and allied industries, which require that starters for fractional horsepower motors up to 2 horsepower provide undervoltage protection and be electrically interlocked with other starters. Past practice dictated either the omission of over-

load protection or the application of a size 1 starter to these motors, but through recent design and development the Trumbull Company is now able to offer the electrical industry a completely modern starter—the Size O, Type M-2.

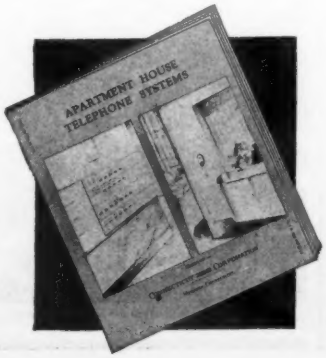
The M-2 Starter consists essentially of a 3 or 4-pole contactor with two hand or automatic reset isothermic temperature overload relays mounted on the contactor frame, and enclosed in a suitable case. One pole of the contactor is used as a holding interlock, and extra interlocks can be added if required.

Apartment Telephone Systems

A new catalog of "Connecticut" apartment house telephone systems has been released by Connecticut Telephone & Electric Corporation, Meriden, Conn.

The catalog contains 36 pages and covers the complete range of equipment in this line—vestibule boxes, button directories and phones, suite phones, tradesmen's phones, janitors' annunciator-phones, switchboards, electric door openers, and installation equipment. Wiring diagrams and specifications for nine of the most popular phone systems are also included.

Most of the equipment shown is of new design and has been developed



With a new plant just completed WECO is now in position to furnish a full line of every type of outlet box, bar hanger, clamp, combination, and switch box with lath supports, extended ears or any standard accessory.

Many outstanding features of construction are offered such as:

- Bar Hangers have Set Screws to tighten box in position.
- Weco Tint, heavy galvanized finish to meet Federal Specifications.
- Every box carefully designed and manufactured.

Write for Catalog No. 9

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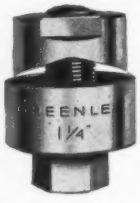
Greenlee Hydraulic Conduit and Pipe Benders are timesavers, because they bend faster than by other hand methods. In addition, they make smooth, even bends, making it easy to pull in wire and cable.

Knockout Tools



Greenlee Punches and Cutters make it easy to enlarge holes in switch boxes, cabinets etc. They form clean-cut holes quickly and accurately, without reaming or filing.

Our new Catalog, No. 31E, illustrates and describes these tools, as well as many others of interest. If you do not have a copy, send for one now.

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within the past year. An interesting feature of one of the new suite phones is a pilot light which tells the tenant when the vestibule door has been opened, thus eliminating the embarrassment frequently caused when a caller "misses" the door-opener signal.

Bonded Armored Cable

Triangle Conduit and Cable Company, Elmhurst, New York, N. Y., announce the production of a new Double Bushed and Bonded Cable constructed with a tinned copper bond wire placed between the insulation and the steel armor. The bond wire bridges the convolutions of the steel, thereby assuring that the resistance of No. 14-2 armored cable will not

exceed one ohm, and other sizes will show a proportionate resistance.

This is said to be a 100% safe armored cable, one that effectively eliminates the personal and property hazard due to varying resistance; one that provides complete protection to the wiring circuit in the event of accidental ground or short; one that insures a low resistance path to ground. Note that the bonded wire cannot be used as a ground wire and can not be confused as a third leg or neutral. No sacrifice has been made in flexibility or ease of installation.

Irregular Fixture Spacing Featured

(*Continued from page* 21)

builds up colors to the point where the merchandise is more attractive. And in my business, color appeal is of prime importance.

"Yet the elements of this lighting system are of such character that the customer is not conscious of the source of light. He does not notice the soft and inconspicuous spots of light on the ceiling. Only in a casual way does the glow of the mercury bays register. That is because the customer does not look up, he is looking at the merchandise below the eye level and the merchandise stands out more brilliantly than in any store I ever visited.

"So favorable is the reaction of customers to the mercury vapor bay lights that I have often had individuals tell me they thought it was sunlight. Tests have shown, in fact, that the combination of the two light elements results in a very close approach to daylight."

Mr. Clarke says his new installation gives him 34 foot-candles on the displayed merchandise, compared with an average of 18.

Understanding and Using The Electrical Code

(*Continued from page* 20)

conditions. It is essential, then, that a polyphase motor be completely disconnected when it is to be shut down.

As stated in a previous paragraph, the use of a neutral bar and connectors serves as an acceptable means of disconnecting the neutral at the service switch from the source of supply. For the ungrounded conductors, the disconnecting means may be a switch or a manually operable air break or oil immersed circuit breaker. The switch or circuit breaker, in addition, must be equipped with a handle or lever so that it may be operated mechanically by hand. Quite often it is convenient to operate the disconnect by a remote control push button. Whenever such a device is installed it cannot replace the hand lever but may be installed in addition to the manual handle.

Under all conditions the discon-

"I'm at hotel
Mayfair"
CENTER OF ST. LOUIS BUSINESS
"Fine, that's near my office"
Over 50% of all rooms $3.50 or less, single; $5.00 or less, double

nect must definitely show whether it is open or closed. The disconnect must satisfy two other conditions: (1) It must be externally operable, and (2) it must be readily accessible. Both of these conditions are fully covered by the definitions in Article 100. The fine print note appended to Article 230 of the Code (section 2356) recommends the use of standard service equipment for the individual apartments and office suites of multiple occupancy buildings.

In the case of residential buildings, where loads and wiring installations are more or less permanent, this recommendation has been quite universally adopted and each apartment usually has installed an externally operable service switch and fuse or service circuit breaker.

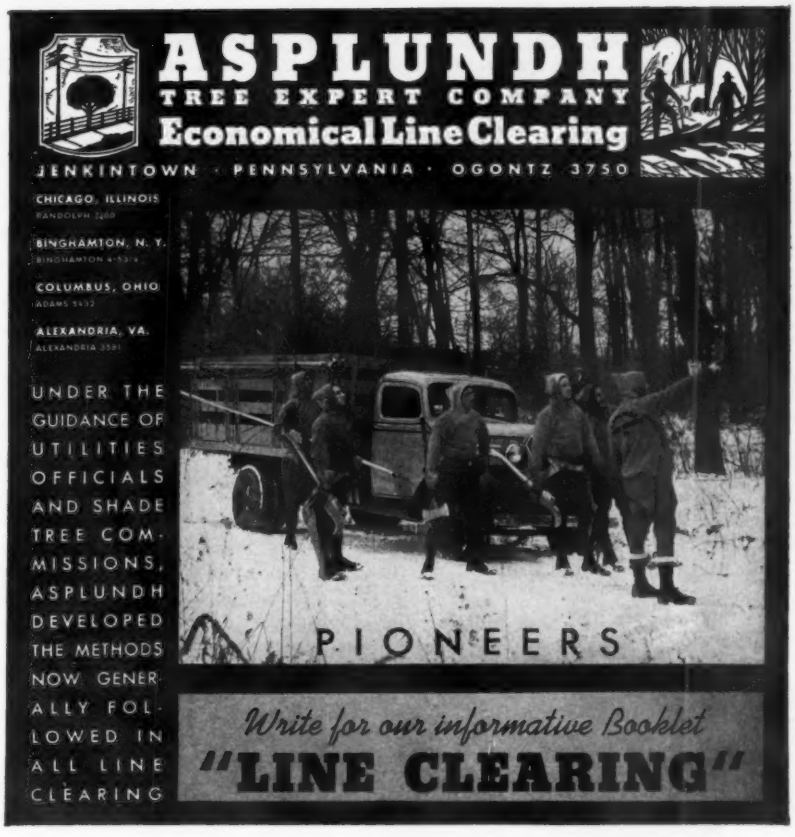
In office buildings, the loading and wiring is not generally permanent, so that the distribution center must be designed for greater flexibility. Any floor in an office building may be subdivided for individual tenants with individual meters and services for each room on that floor. Then again, any one tenant on that floor may expand and gradually occupy two or more rooms. Metering and service panels have been developed to allow this flexibility. Many of these provide space for, or have built into them, standard service equipment for the individual subdivisions of the service.

The rating of the service disconnect depends on the size of the fuse holder of the overcurrent protection device in series with it. Under no conditions can it be smaller than this fuse holder rating. The second sentence of section 2357 is very important. Special permission, i.e., written approval of the local Code enforcing authority, must be obtained to install a 30-ampere, two-wire disconnect for any system having more than two 15-ampere branch circuits. This rule is quite logical in that it places the burden of proof on the customer or contractor to show the inspection authority that three or more circuits on a 30-ampere, two-wire service will at no time place overload on the service equipment.

It must be remembered that three minimum branch circuits—15 amperes, two wire—potentially makes it possible to place 3 x 15 or 45 amperes on a 30-ampere switch. Of course, there may be many cases where three or even four or five 15-ampere branch circuits may not ever impose more than 30 amperes burden on the service and under these conditions special permission, that is, written approval, can be obtained upon proof of the case.

A corollary requirement based on this ruling would indicate that more than four, fifteen-ampere two-wire branch circuits on a three-wire service would require special permission for the installation of a 30 ampere, three-wire service switch. It is interesting to note that there is no minimum requirement on the size of the service fuse or circuit breaker. While up to recent years a 30-ampere, two-wire switch was the minimum size available for service equipment, it is quite possible that a 15 ampere breaker may be developed for service equipment and this may change our thoughts on this subject of minimum requirements.

The requirements set forth in the final section of these rules in this group need some clarification. The intent of these rules is to require all services to be grouped at one location and properly marked to identify just what type of loading is supplied and the voltage rating of the source of supply, provided these services are obtained from different transformers or from different secondary distribution systems. If the services are taken from the same transformer bank or secondary distribution system, as permitted in sections 2302-c and 2321 they need not be grouped. It is, of course, the better plan to group all service facilities under all conditions if possible or practical.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UNDER THE GUIDANCE OF UTILITIES OFFICIALS AND SHADE TREE COMMISSIONS, ASPLUNDH DEVELOPED THE METHODS NOW GENERALLY FOLLOWED IN ALL LINE CLEARING
PIONEERS
Write for our informative Booklet
"LINE CLEARING"

This Dealer Didn't Listen To "Poor Market" Talk

(*Continued from page* 16)

that it is just as easy to sell a machine to a family sufficiently well-to-do that it has no laundry worries as to the woman who does her own family wash. Demonstrations pay especially with this former class.

The keystone in the success of the selling program, according to Mr. Rittman, is a card index on each prospect that immediately classifies her, ascertains her individual need, lists her home address

and telephone, business address and telephone, make of the present washer she owns, its age, the number in her family, the laundry cost per week, the trade-in offered and the trade-in wanted, the best time to see her, and the source of prospect. It calls, also, for a classification of the type of prospect and on the back lists six types.

These are: the woman who does her own work; the woman who employs a laundress by the day; the woman who sends her laundry to the commercial wet wash laundry and hires a laundress to do the ironing; the woman who sends the laundry out to be washed and ironed; and the woman who has a maid to do all her work. Time and labor savings appeal to the first three, economy appeals to the fourth, elimination of washday nuisance and reduction of expense appeals to the fifth. Individual appeal taking into consideration cost, speed in preparation of laundry and other factors are used with the sixth. And this sixth class buys many washing machines.

Each sale effort is planned from this study, the information for which is obtained casually during the initial conversation. The record of selling activity with the date is written on the card. These cards can be studied in the future, constitute a valuable record of consumer reactions to sales procedure, enable a concrete account of successful methods to be kept, and guard against repetition of the same errors by other salesmen who ordinarily would be unfamiliar with the details of his co-worker's failures.

Heavy Trade-in Volume Made Profitable

(*Continued from page* 14)

buyers are inclined to back away from owning anything, which someone else has used. Current financing plans encourage their indulgence in that feeling. They are seldom interested in "second hand" articles of any kind. On the other hand, a betterment in the financial situation of a reconditioned appliance purchaser, is more likely to bring him back, a "satisfied customer," for an up-to-the-minute model.

Rapid and profitable disposition of "trades" expands the firm's ability to accept them and broadens its market.

Planning Effective Sales Contests

(*Continued from page* 10)

do it under rules which give neither any advantage, it will add to the zest of the contest without any chance of arousing any ill-feeling. This combination of competition against quota, and against the other fellow, with an injection of an element of chance to add zest, can be skillfully handled, as will be described in some of the contests to be discussed in future articles of this series.

With the basis of individual competition established, a suitable vehicle for the contest must be selected. That is, a guise must be thrown over the business of selling, a spade must be called anything but a spade, and in choosing the vehicle, the contest manager is limited only by his imagination. Refrigerators can become laps in a speedway race, canvass calls can become straws on a camel's back, new customers may become additional wives in King Solomon's harem.

In picking the guise for the contest, and the medium through which to promote it, it should be remembered that there is no such thing as a completely "canned" contest. Many contests are presented in ready-to-run form, but alterations and adaptations must be made in every case to fit the individual case. Every sales staff has its own peculiarities of market and men, and no two are alike. Any contest vehicle must be worked over by the sales manager and made to fit the particular pattern of his own organization.

Thirdly, the prizes must be selected. Here, again, the sky is the limit of the manager's imagination, but the point is one which demands careful consideration. The question of merchandise prizes versus cash awards has been a hotly contested one among contest users, and in many instances the decision has been placed in the hands of the salesman, leaving it to him to decide which he would rather receive.

Summarizing, the successful staging of a contest requires five tasks of the sales manager: establish a basis of competition, select a contest, adapt it to the organization, set up prizes, and, most important of all, merchandise the contest to the salesmen. Complete details of the carrying out of these steps and the complete elucidation of numerous specific types of contests, all outstandingly successful, will be discussed in succeeding articles of this series.

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at Prices well within the scope of YOUR CUSTOMERS' BUDGETS!

FREDERICK ANTHRACITE and BITUMINOUS STOKERS

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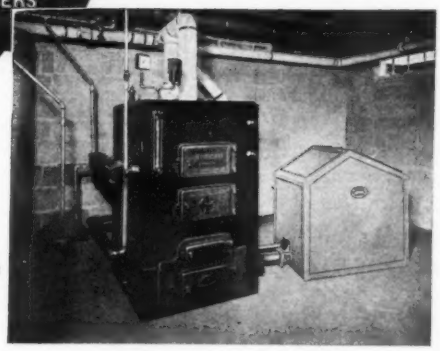
(Ask about Liberal Dealers' Proposition; some good territory is still open.)



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EDWIN L. WIEGAND CO., 7600 Thomas Blvd., Pittsburgh, Pa.

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